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ROCK ISLAND DAM SMOLT MONITORING, 1988

FINAL REPORT

by

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## ABSTRACT

Downstream migrating salmon (*Oncorhynchus* spp.) and steelhead trout (*Salmo gairdneri*) smelts were monitored at the Rock Island Dam bypass trap from 2 April - 31 August, 1988. Data collected included: 1) number of fish caught by species, 2) number of branded fish caught by species, 3) daily average riverflow, 4) daily average powerhouse #1 and #2 flows and daily average spill. These data were transmitted to, and used by, the Fish Passage Center to manage a "water budget" of allocated upstream water storage to augment river flows to improve survival of downstream migrating salmonids. The Rock Island Dam trapping facility collected 129,781 downstream migrating **salmonids** in 1988. Collected fish included 5,596 chinook salmon (*Oncorhynchus tshawytscha*) and 1,048 steelhead which had been freeze branded (to determine migration rates) and 6,974 chinook and 21,693 steelhead with clipped adipose fins. The middle 80% of the 1988 spring migration (excluding sub-yearling chinooks) passed Rock Island Dam during a 32 day period, 25 April - 26 May. The spring migration timing was influenced by the presence of accelerated growth sub-yearling chinook that were recorded as yearling chinook. The spring migration excluding this group was 31 days, from 25 April to 25 May. Passage rates of hatchery released chinook and steelhead smelts and the downstream migration timing of all **salmonids** are presented. The spring migration timing of juvenile **salmonids** is strongly influenced by hatchery releases above Rock Island Dam.

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## INTRODUCTION

In 1982, the Northwest Power Planning Council developed a fish and wildlife program to protect, mitigate and enhance fish and wildlife resources affected by construction and operation of Columbia River hydroelectric facilities. Under this program, a "water budget" of allocated upstream water storage was established to be used for instream flow augmentation to improve survival of downstream migrating salmon (*Oncorhynchus* spp.) and steelhead trout (*Salmo gairdneri*). The Council's plan also called for studies to monitor juvenile fish migration timing and survival. This information is applied to the daily management and evaluation of the water budget. The fishery agencies and tribes formed a Water Budget Center (renamed as the Fish Passage Center) to direct the use of the water budget and to conduct and coordinate studies related to water budget management and evaluation. The Fish Passage Center developed a Smelt Monitoring Program and selected several sites on the Columbia and Snake rivers as smelt monitoring stations. Rock Island Dam was selected as one of these stations. It is the first dam downstream from all of the major salmon and steelhead producing tributaries of the mid-Columbia River (Figure 1).

The 1988 Smelt Monitoring Program for the mid-Columbia River was designed to index the daily number of outmigrating **salmonids** and to report numbers of marked juveniles collected. Data collected under this program allow comparison and evaluation of year to year migration timing and travel time of different stocks of naturally and hatchery produced juvenile **salmonids**.

Funding of the program, as implemented by the Fish Passage Center, was provided by the Bonneville Power Administration. The Public Utility District No. 1 of Chelan County (**Chelan** PUD) provided the trapping facility, personnel, and equipment to conduct the monitoring.

## METHODS

Daily sampling data collected at the Rock Island Dam monitoring station included 1) total number of fish caught by species, 2) total number of branded fish caught by species, 3) daily average riverflow, 4) daily average power-house- flow through Rock Island #1 (old powerhouse) and Rock Island #2 (new powerhouse) (Figure 2), and daily average spill. The flow data were recorded so that an expanded index of fish passage through powerhouse #2 could be developed based on the bypass collection count in relation to the proportion of total riverflow passing through powerhouse #2.

To provide travel time estimates between hatchery release points and Rock Island Dam, yearling and sub-yearling chinook (*Oncorhynchus tshawytscha*), and steelhead, in state and federal

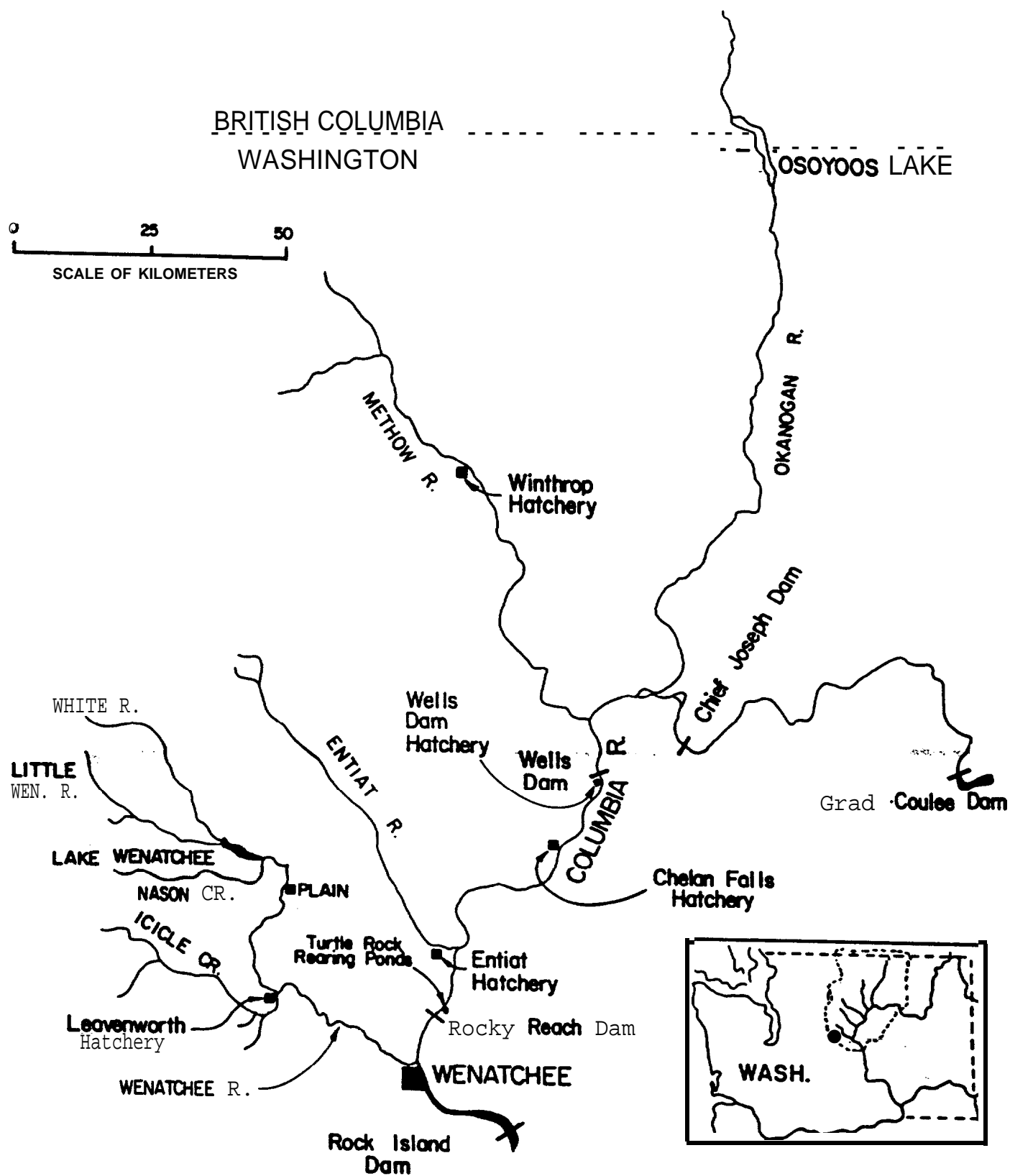


Figure 1. Columbia River between Rock Island and Grand Coulee dams showing major tributaries and hatcheries.



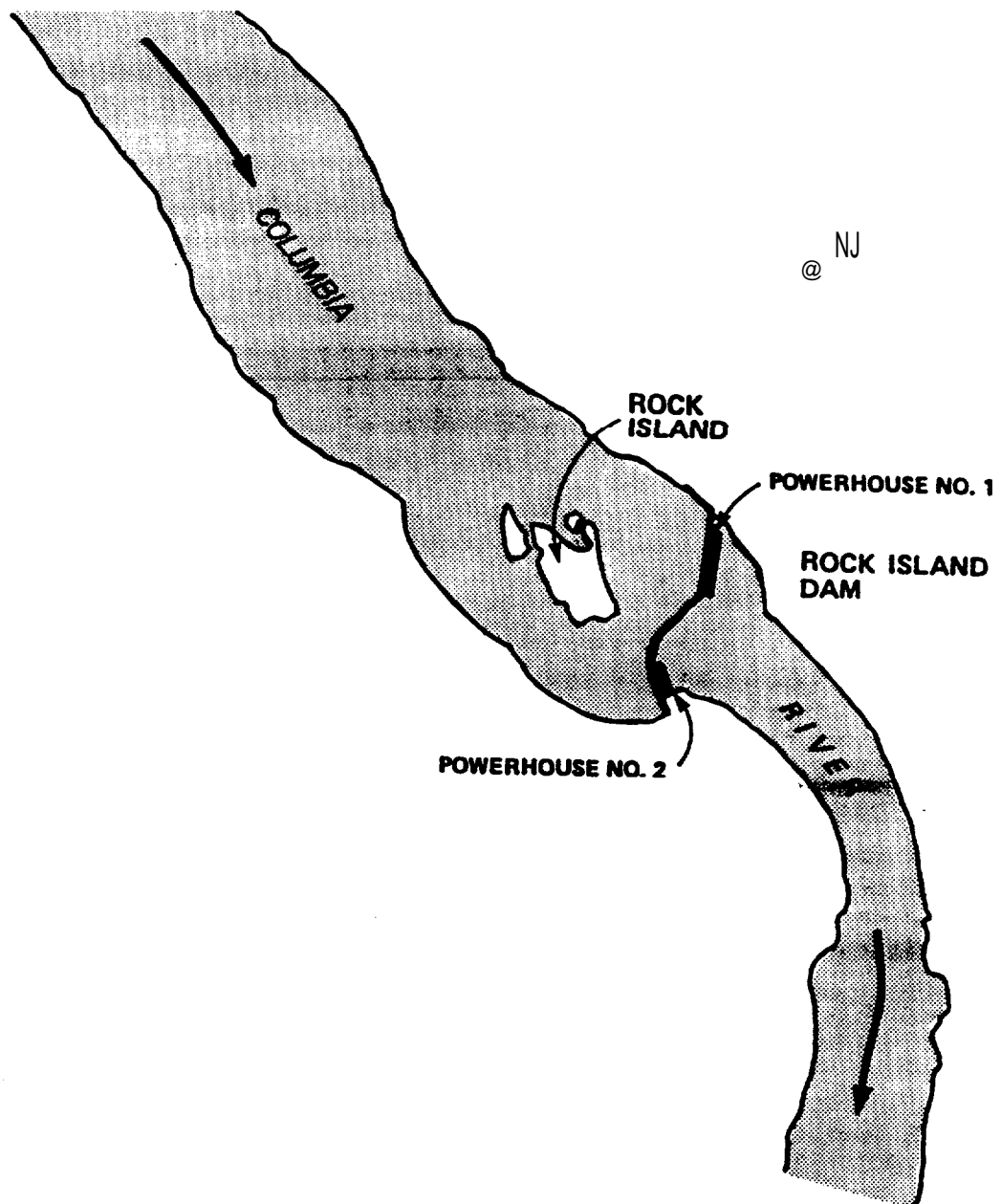


Figure 2. Location of powerhouse #1 and powerhouse #2 of Rock Island hydroelectric project.

hatcheries, were freeze branded (using liquid nitrogen) and released. Approximately 13% of the released chinook were marked with wire-coded tags and clipped adipose fins. All hatchery reared steelhead released in Washington state waters have been adipose fin clipped since 1985. A comparison of timed releases of marked smelts (according to brand configuration) to daily sample recoveries of these branded smelts at the bypass trap provided travel time estimates between the release points and the dam. Unmarked hatchery and naturally produced **salmonids** were also monitored to provide an indicator of the peak arrival times for each species at Rock Island Dam.

Fish collected by the trap during the 24 hour sampling period (0900-0900) were held in the bypass flume before being delivered, via an elevator hopper, to an 8' x 8' x 3' portable fiberglass holding tank (Figures 3, 4, 5). The holding tank was supplied with a continuous water flow from the right bank fishladder with a 5 horsepower submersible pump.

Groups of 30-50 fish were anesthetized with a solution of Tricaine methane **sulfonate** (MS 222) before handling. Fish were identified by species and examined for brands and clipped fins in a sampling shed adjacent to the holding tank (Figure 5). Fork length measurements were taken three times per week from subsamples of sockeye (*Oncorhynchus nerka*), steelhead, and after 1 June from sub-yearling chinook. Steelhead were categorized as "hatchery" or "naturally-produced" according to clipped adipose fin, or if an adipose fin was present, a worn appearance of the dorsal and ventral fins (Peven and Hays 1986). The fish were then allowed to recover in an isolated section of the holding tank.

After the examined fish had fully recovered from the effects of the MS 222, they were released through a 4" PVC pipe from the recovery section of the tank (elevation 620' **m.s.l.**) to the **tailrace** (elevation 574' **m.s.l.**) (Figure 5). The release area of the tailrace was protected from gull predation with parallel lengths of 80 pound test monofilament fish line tied at approximately 6 foot intervals overhead of the pipe outlet. In addition, an employee of the U. S. Department of Agriculture's Animal Damage Control Division effectively diverted gulls away from the tailrace during the middle 80% of the spring migration by using various behavior modifying techniques that repulsed the birds.

Data pertinent to the smelt monitoring program were transferred from **Chelan P.U.D.** headquarters in Wenatchee, WA to the Fish Passage Center (Portland, OR) daily via a IBM personal computer linked to telephone lines, with resident software on the Fish Passage Center's IBM System 36.

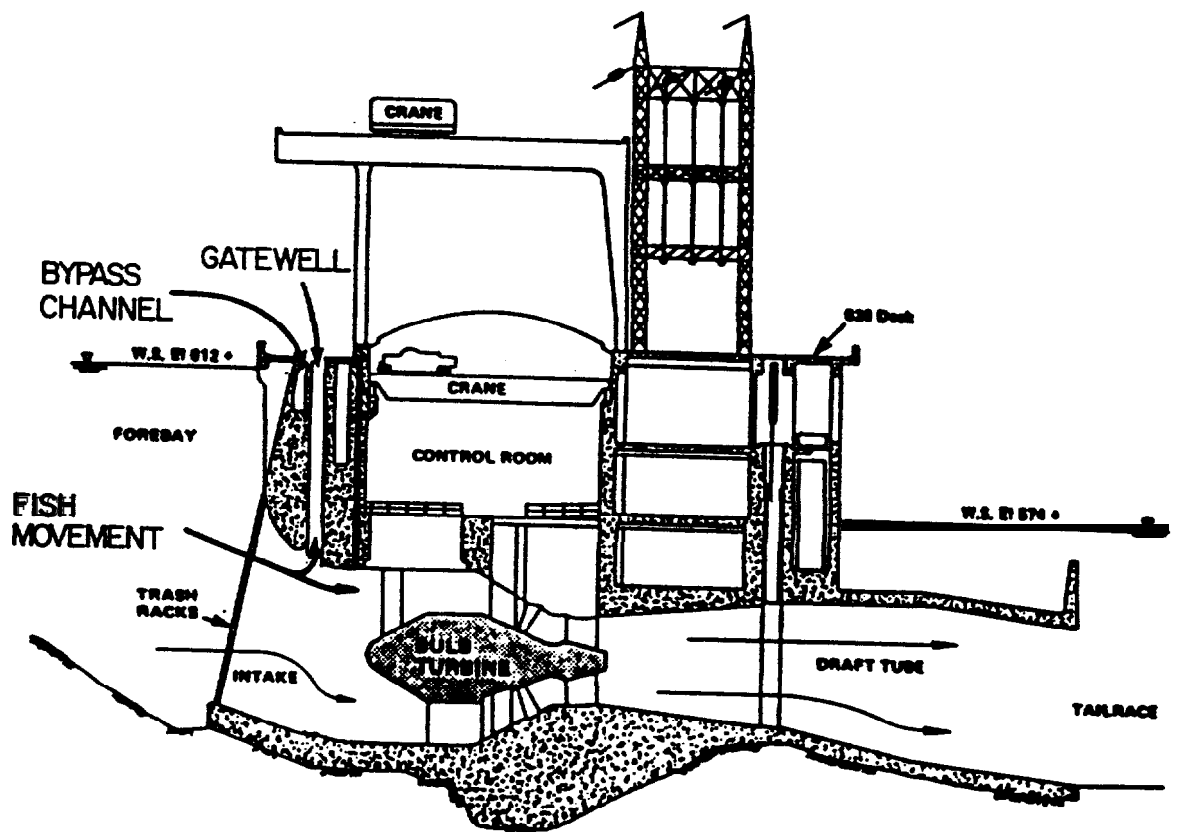


Figure 3. Section through Rock Island Dam second powerhouse indicating fish movement into gatewell system.

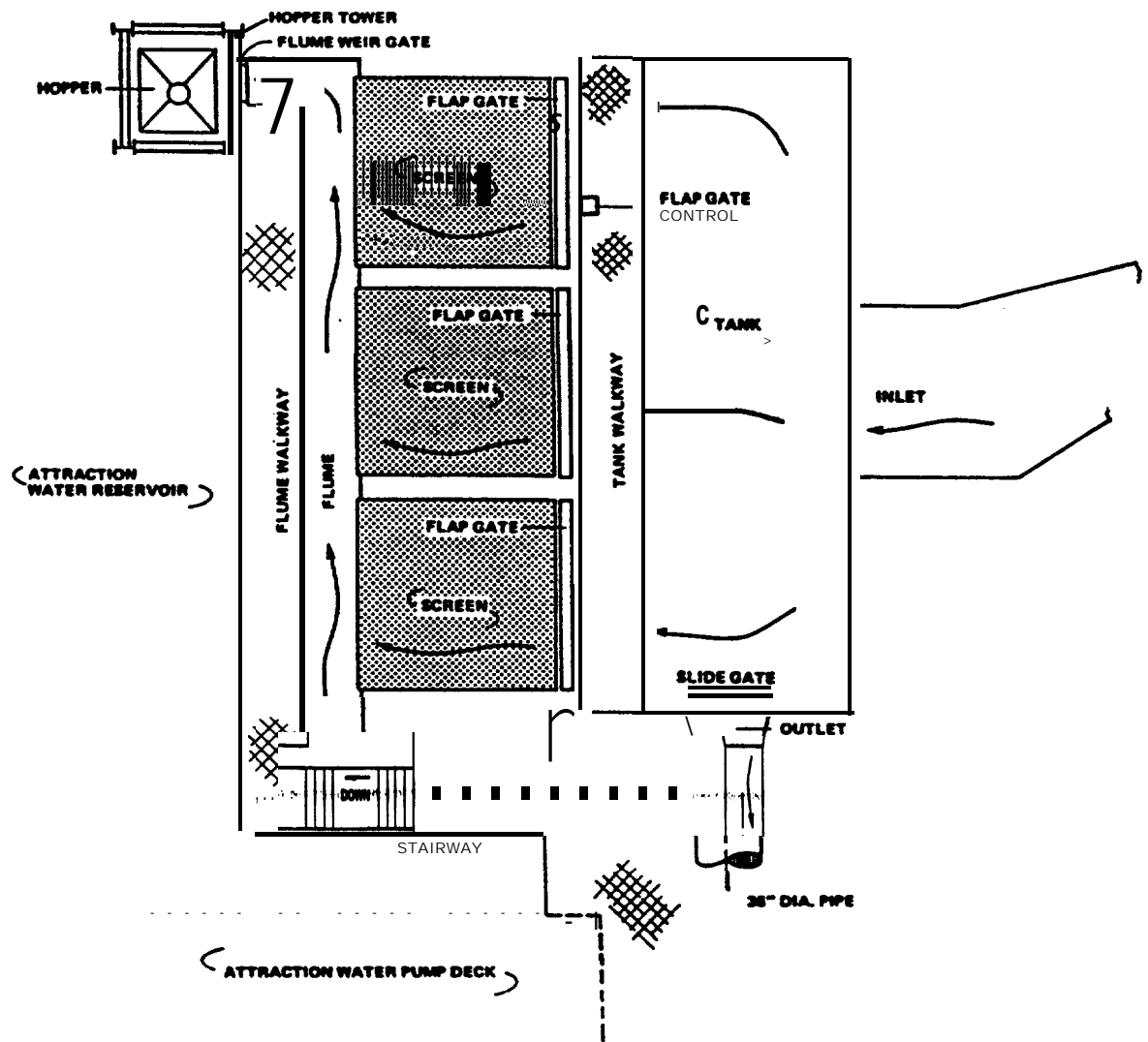


Figure 4. Rock Island Darn juvenile salmonid fingerling collection trap.

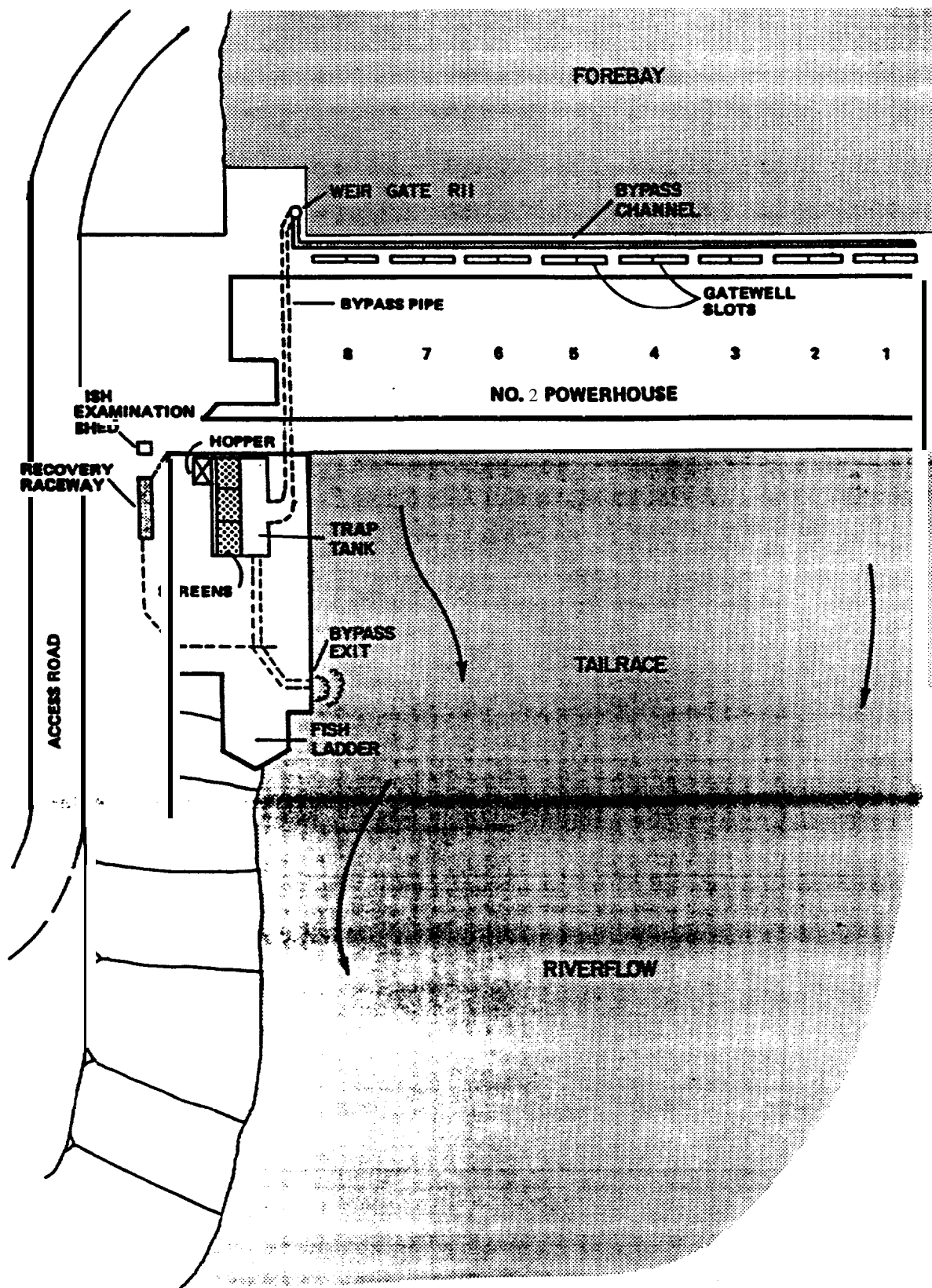


Figure 5. Plan view of juvenile salmonid bypass and collection system at Rock Island Dam second powerhouse (taken from Olson 1983).

## RESULTS AND DISCUSSION

The Rock Island trapping facility collected 129,781 juvenile salmon and steelhead during the 1988 smelt monitoring program (Appendix A-1 - A-6). A total of 5,596 freeze branded chinook salmon and 1,048 freeze branded steelhead trout representing 25 distinct marks and releases, were collected and recorded during 1988 (Table 1, **Apps.** D-1 - D-6, E-1 - E-6). In addition, we collected 6,974 chinook and 21,693 steelhead with clipped adipose fins (Appendix D-1 - D-6).

The bypass trapping facility operated without mechanical failure during the smelt monitoring program. Between 2 April and 26 May no fish were collected from unit # 1 of the second powerhouse (during a bar screen prototype study). Fish were collected from 12 of the 16 gate slots during the remainder of the study because units 7 and 8 (second powerhouse) were shut down during the study (for turbine repairs and replacement).

An examination of daily powerhouse #2 turbine flows in proportion to total river flow showed a variance in powerhouse operations during the period of peak **salmonid** outmigration. Monthly average powerhouse #2 flows for the period of 2 April through 30 June ranged from 63.2% to 76.7% of average total riverflow and daily averages ranged from 49.1% to 92.8% (Table 2).

Average daily hydraulic data for Rock Island Dam were supplied to the Fish Passage Center, which used it to develop an expansion of Rock Island trap data (Appendix B-1 - B-6). The expansion was derived by multiplying the actual trap collection count by the inverse proportion of water passing through powerhouse #2 during the sampling period (i.e.,  $(\text{collection count} \times 100) / (\text{powerhouse \#2 flow} / \text{powerhouse \#1 flow} + \text{powerhouse \#2 flow} + \text{spill}))$ ). A comparison of actual trap collection counts to the expanded index (Table 3) indicated differences in the smelt timing estimates. The largest difference in timing estimates observed between the two counts was an eight day difference in the 90% passage date for total **salmonids** (Table 3, App. C-6). Actual count data were used in our analysis and discussion.

Table 1. Summary of brand recovery rates for yearling chinook, sub-yearling chinook, and steel head trout, 2 April -31 August 1988.

| Fish                              | Brand    | Release date | Release site             | Branded fish released | First recov. date | Last recov. date | 10% recov. date | 50% recov. date | 90% recov. date | # recov. | z recov. |
|-----------------------------------|----------|--------------|--------------------------|-----------------------|-------------------|------------------|-----------------|-----------------|-----------------|----------|----------|
| <b>Chinook</b>                    |          |              |                          |                       |                   |                  |                 |                 |                 |          |          |
| <b>yearling</b>                   |          |              |                          |                       |                   |                  |                 |                 |                 |          |          |
|                                   | LA/7C/1  | 4/19/88      | Methow R.                | 23,098                | 4/24/88           | 6/02/88          | 4/30/88         | 5/1 5/88        | 5/27/88         | 133      | 0.576    |
|                                   | LA/7C/3  | 4/19/88      | Methow R.                | 23,097                | 4/26/88           | 5/31/88          | 5/08/88         | 5/22/88         | 5/26/88         | 118      | 0.511    |
|                                   | RA/7C/1  | 4/19/88      | Methow R.                | 23,140                | 4/25/88           | 6/01 /88         | 4/29/88         | 5/12/88         | 5/25/88         | 94       | 0.406    |
|                                   | RA/7C/3  | 4/19/88      | Methow R.                | 23,942                | 4/26/88           | 6/21 /88         | 4/30/88         | 5/12/88         | 5/26/88         | 95       | 0.397    |
|                                   | RA/7H/1  | 4/21/88      | Entiat R.                | 32,172                | 4/23/88           | 6/02/88          | 4/25/88         | 4/28/88         | 5/1 1 /88       | 75       | 0.233    |
|                                   | RA/7T/1  | 4/20/88      | Wenat. R.                | 47,476                | 4/22/88           | 5/19/88          | 4/22/88         | 4/30/88         | 5/12/88         | 214      | 0.451    |
|                                   | LA/15/1  | 4/22/88      | Wenat. R.                | 35,002                | 4/24/89           | 5/26/88          | 4/25/88         | 5/05/88         | 5/12/88         | 107      | 0.306    |
|                                   | LA/15/3  | 4/22/88      | Wenat. R.                | 34,910                | 4/17/88           | 5/29/88          | 4/25/88         | 5/06/88         | 5/14/88         | 112      | 0.321    |
|                                   | RA/15/1  | 4/22/88      | Wenat. R.                | 33,919                | 4/24/88           | 5/25/88          | 4/26/88         | 5/08/88         | 5/12/88         | 131      | 0.386    |
|                                   | RA/15/3  | 4/22/88      | Wenat. R.                | 34,810                | 4/24/88           | 5/28/88          | 4/25/88         | 5/06/88         | 5/1 3/88        | 155      | 0.445    |
|                                   |          |              | Totals:                  | 311,566               |                   |                  |                 |                 |                 | 1,234    | 0.396    |
| <b>Accelerated growth chinook</b> |          |              |                          |                       |                   |                  |                 |                 |                 |          |          |
| <b>subyr'ing</b>                  |          |              |                          |                       |                   |                  |                 |                 |                 |          |          |
|                                   | LA/I 0/1 | 4/22/88      | Wenat. R.                | 28,789                | 4/10/88           | 6/22/88          | 4/17/88         | 5/1 3/88        | 6/06/88         | 292      | 1.014    |
|                                   | LA/10/3  | 4/22/88      | Wenat. R.                | 23,389                | 4/12/88           | 6/18/88          | 4/16/88         | 5/07/88         | 6/04/88         | 231      | 0.988    |
|                                   | RA/10/1  | 4/22/88      | Wenat. R.                | 28,459                | 4/12/88           | 6/23/88          | 4/24/88         | 5/07/88         | 6/05/88         | 297      | 1.044    |
|                                   | RA/10/3  | 4/22/88      | Wenat. R.                | 28,897                | 4/11/88           | 6/20/88          | 4/19/88         | 5/05/88         | 6/06/88         | 299      | 1.035    |
|                                   | LA/12/1  | 4/22/88      | Wenat. R.                | 33,492                | 4/24/88           | 6/17/88          | 4/27/88         | 5/18/88         | 6/08/88         | 357      | 1.066    |
|                                   | LA/12/3  | 4/22/88      | Wenat. R.                | 24,814                | 4/24/88           | 6/17/88          | 4/27/88         | 5/20/88         | 6/08/88         | 291      | 1.173    |
|                                   | RA/12/1  | 4/22/88      | Wenat. R.                | 33,277                | 4/24/88           | 6/17/88          | 4/26/88         | 5/20/88         | 6/08/88         | 341      | 1.025    |
|                                   | RA/12/3  | 4/22/88      | Wenat. R.                | 33,499                | 4/24/88           | 6/17/88          | 4/26/88         | 5/1 6/88        | 6/07/88         | 391      | 1.167    |
|                                   | LA/1Z/1  | 5/7/88       | Wenat. R.                | 29,110                | 5/17/89           | 6/27/88          | 5/21 /88        | 6/09/88         | 6/1 7/88        | 396      | 1.360    |
|                                   | LA/1Z/3  | 5/16/88      | Wenat. R.                | 28,383                | 5/18/88           | 6/28/88          | 5/20/88         | 6/08/88         | 6/1 7/88        | 409      | 1.441    |
|                                   | RA/1Z/1  | 5/16/88      | Wenat. R.                | 29,457                | 5/18/88           | 6/28/88          | 5/20/88         | 6/08/88         | 6/1 7/88        | 458      | 1.555    |
|                                   | RA/1Z/3  | 5/16/88      | Wenat. R.                | 30,044                | 5/18/88           | 6/26/88          | 5/20/88         | 6/08/88         | 6/1 7/88        | 471      | 1.568    |
|                                   |          |              | Totals:                  | 351,610               |                   |                  |                 |                 |                 | 4,233    | 1.204    |
| <b>Chinook</b>                    |          |              |                          |                       |                   |                  |                 |                 |                 |          |          |
| <b>subyr'ing</b>                  |          |              |                          |                       |                   |                  |                 |                 |                 |          |          |
|                                   | RD/R/3   | 5/22/88      | Wells Dam                | 99,061                | 6/01/88           | 7/27/88          | 6/05/88         | 6/23/88         | 7/02/88         | 129      | 0.130    |
| <b>Steel head</b>                 |          |              |                          |                       |                   |                  |                 |                 |                 |          |          |
|                                   | LA/7U/1  | 4/18/88      | Smk'l'mn R.              | 40,000                | 4/26/88           | 5/24/88          | 5/02/88         | 5/10/88         | 5/1 7/88        | 667      | 1.668    |
|                                   | RA/7U/3  | 4/20/88      | Methow R.                | 30,000                | 4/26/88           | 5/22/88          | 4/29/88         | 5/04/88         | 5/12/88         | 381      | 1.270    |
|                                   |          |              | Totals:                  | 70,000                |                   |                  |                 |                 |                 | 1,048    | 1.497    |
|                                   |          |              | Totals for entire study: | 832,237               |                   |                  |                 |                 |                 | 6,644    | 0.798    |

Table 2. Rock Island Dam powerhouse operations expressed in KCFS and percent streamflow, April 1 - 31 August.

|                                       | Average KCFS         |                       |                       |                      |                      |
|---------------------------------------|----------------------|-----------------------|-----------------------|----------------------|----------------------|
|                                       | April                | May                   | June                  | July                 | August               |
| Total river flow<br>(monthly range)   | 74.2<br>(34.6-103.6) | 112.2<br>(56.4-151.1) | 107.4<br>(66.0-150.7) | 83.2<br>(54.6-113.8) | 77.4<br>(41.9-106.5) |
| Powerhouse #1 flow<br>(monthly range) | 14.0<br>(0.5-29.9)   | 21.4<br>(2.1-44.9)    | 31.0<br>(4.0-62.6)    | 18.2<br>(0.5-39.4)   | 12.4<br>(0.5-31.8)   |
| Powerhouse #2 flow<br>(monthly range) | 56.0<br>(30.0-75.8)  | 68.9<br>(39.1-87.3)   | 75.5<br>(57.8-92.3)   | 64.0<br>(49.3-75.5)  | 64.0<br>(40.0-79.6)  |
| Spi11<br>(monthly range)              | 3.6<br>(0.0-17.9)    | 20.6<br>(0.0-35.1)    | 0.0<br>(0.0)          | 0.0<br>(0.0)         | 0.0<br>(0.0)         |
| Average percent of total flow         |                      |                       |                       |                      |                      |
| Powerhouse #1<br>(monthly range)      | 18.1<br>(0.7-30.9)   | 17.5<br>(4.0-30.0)    | 26.7<br>(5.9-43.1)    | 20.2<br>(0.9-36.2)   | 14.1<br>(1.0-30.8)   |
| Powerhouse #2<br>(monthly range)      | 76.7<br>(60.5-90.4)  | 63.2<br>(49.1-90.3)   | 72.3<br>(55.8-92.8)   | 78.5<br>(62.8-97.3)  | 84.5<br>(73.1-97.3)  |
| Spi11<br>(monthly range)              | 4.5<br>(0.0-26.2)    | 18.1<br>(0.0-24.2)    | 0<br>(0.0)            | 0<br>(0.0)           | 0<br>(0.0)           |



Table 3. Comparison of actual and expanded fish counts and passage dates for the Rock Island Dam bypass trap, 1988 (expanded data in parentheses).

| spades                   | Numbers              |                    |                     |                      | Dates                |                      |                      |
|--------------------------|----------------------|--------------------|---------------------|----------------------|----------------------|----------------------|----------------------|
|                          | Totals               | 10%                | 50%                 | 90%                  | 10%                  | 50%                  | 90%                  |
| chinook<br>yearling      | 33,588<br>(52,050)   | 3,359<br>(5,205)   | 16,794<br>(26,025)  | 30,229<br>(46,845)   | 4/23/88<br>(4/24/88) | 5/08/88<br>(5/09/88) | 5/27/88<br>(5/26/88) |
| Chinook<br>sub-yearlings | 28,4%<br>(38,301)    | 2,850<br>(3,830)   | 14,248<br>(19,151)  | 25,646<br>(34,447)   | 6/15/88<br>(6/13/88) | 7/05/88<br>(7/03/88) | 8/05/88<br>(8/03/88) |
| Steel head               | 26,332<br>(44,198)   | 2,633<br>(4,420)   | 13,166<br>(22,099)  | 23,699<br>(39,778)   | 5/02/88<br>(5/02/88) | 5/13/88<br>(5/13/88) | 5/24/88<br>(5/22/88) |
| Coho                     | 25,089<br>(42,561)   | 2,509<br>(4,256)   | 12,545<br>(21,281)  | 22,580<br>(38,305)   | 5/13/88<br>(5/12/88) | 5/21/88<br>(5/20/88) | 5/28/88<br>(5/26/88) |
| Sockeye                  | 16,264<br>(24,272)   | 1,626<br>(2,427)   | 8,132<br>(12,136)   | 14,638<br>(21,845)   | 4/21/88<br>(4/21/88) | 5/01/88<br>(5/01/88) | 5/18/88<br>(5/19/88) |
| Total<br>salmonids       | 129,781<br>(201,392) | 12,978<br>(20,139) | 64,891<br>(100,696) | 116,803<br>(181,253) | 4/26/88<br>(4/27/88) | 5/17/88<br>(5/16/88) | 7/09/88<br>(7/01/88) |

## MIGRATION TIMING

### Yearling chinook

Yearling chinook were present the first day of the smelt monitoring program, 2 April, and continued to be present every day until 29 June. The last yearling chinook was collected on 27 July. The 10% and 90% passage dates for yearling chinook were 23 April and 27 May, respectively. Peak passage of 1,473 yearling chinook occurred on 25 April.

An experiment was conducted by Parametrix of Bellevue, Washington to determine the effect of accelerated growth on **smoltification** of sub-yearling chinook. The Fish Passage Center instructed us to record these fish (which were 100% freeze branded and coded wire tagged) as chinook yearlings (brand recapture data from these groups appear in Appendices E-1-E-6). If these fish are subtracted from the yearling chinook daily counts, the 10% and 90% dates of passage were 23 April and 25 May, respectively. The 10% passage date remained the same and the 90% passage date was 3 days earlier.

### Sub-yearling chinook

The first sub-yearling chinook was collected on 2 April. Sub-yearlings were collected sporadically until 19 May, when daily occurrence continued until the end of the smelt monitoring program, 31 August. Peak passage of 1,140 sub-yearling chinook occurred on 29 June. The 10% and 90% passage dates were 15 June and 5 August, respectively, while the 50% passage date for sub-yearling chinook was 5 July (Table 3, App. C-2). Fork length measurements were taken from sub-yearling chinook between 1 June and 26 August (Figure 6). The **bimodal** appearance of these length frequency data is related to naturally and hatchery produced fish being present in the sample (hatchery fish are predominantly larger than naturally produced fish).

### Steelhead

**Daily** collection of steelhead smelts began on 3 April and continued until 28 June, after which, steelhead were intermittently collected in low numbers (<10) until 28 August. Peak passage of 1,869 steelhead occurred on 11 May, 2 days prior to the 50% passage date. The 10% and 90% passage dates were 2 May and 24 May, respectively (Table 3, Appendix C-3).

Fork length measurements were taken from steelhead smelts between 2 April and 24 June. Hatchery smelts were predominantly larger than naturally produced smelts (Figure 7).

### Sockeye

**Sockeye** smelts were present at Rock Island Dam on the first day of the monitoring program, 2 April. The last sockeye smelt was trapped on 28 August. Peak passage occurred on 2 May when 2,051 sockeye smelts were collected. The 10% and 90% passage dates were 21 April and 18 May, respectively, while 50% of the outmigrating

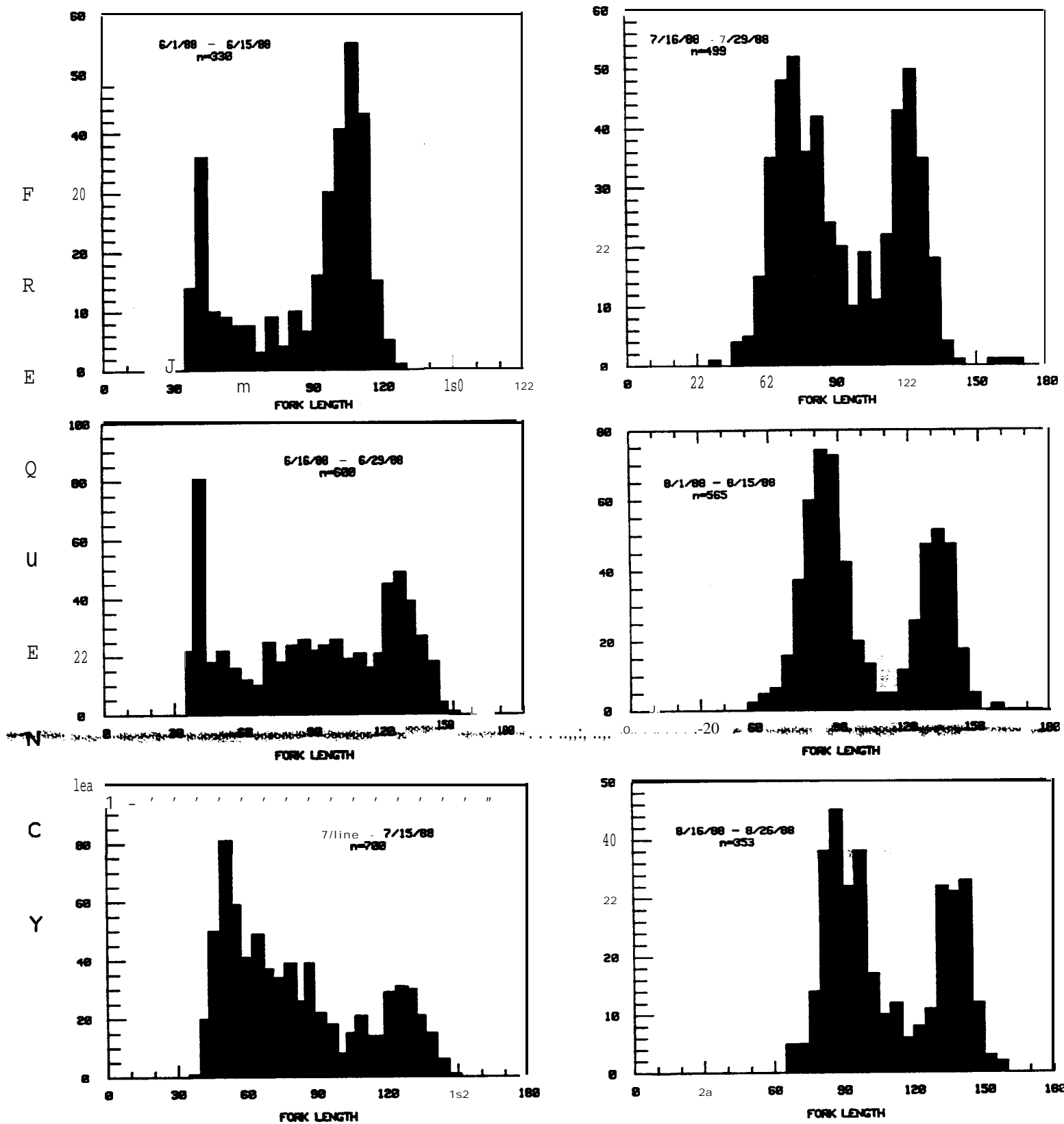


Figure 6. Length frequency histograms (broken down into 2 week periods) of sub-yearling chinook salmon, collected at the Rock Island Dam bypass trap, 1 June - 26 August.

F  
R  
E  
Q  
U  
E  
N  
C  
Y

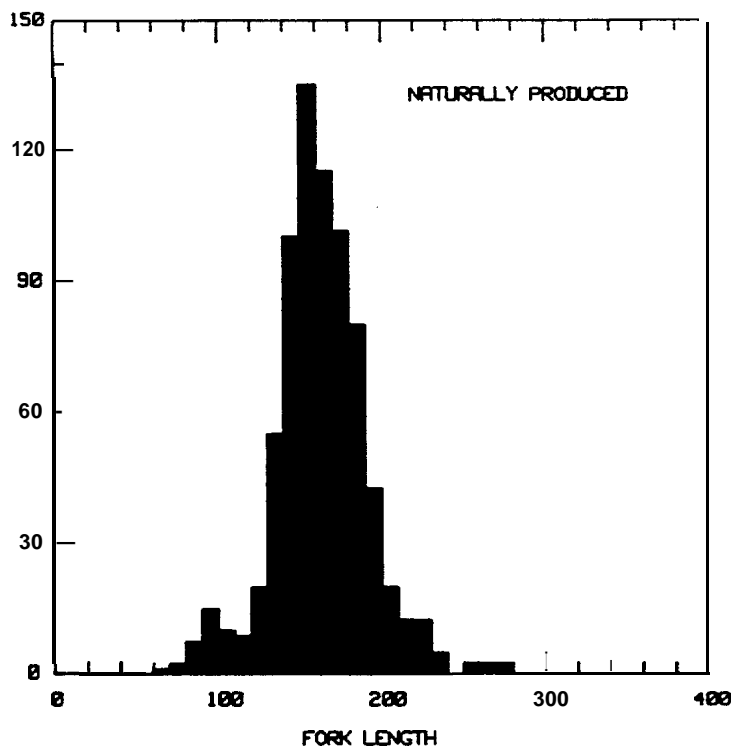
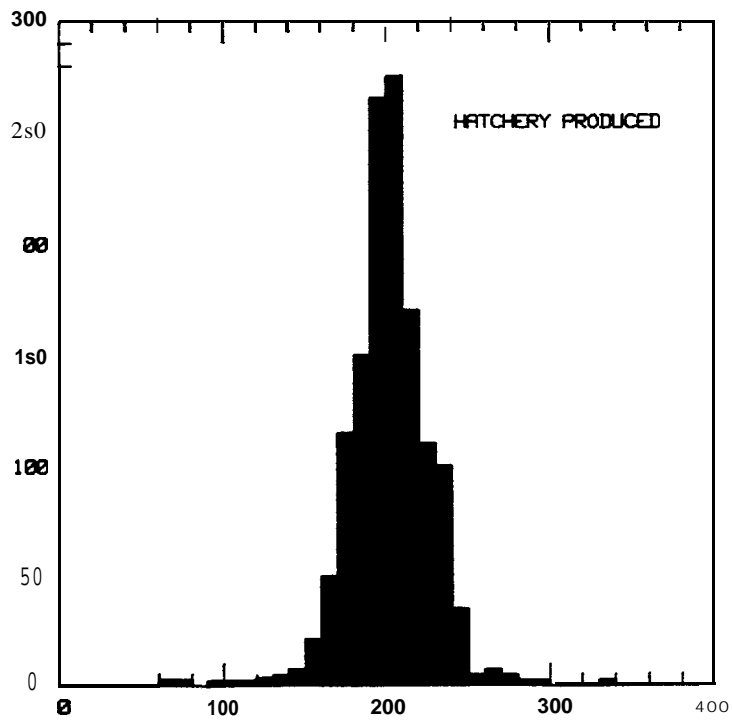


Figure 7. Length frequency histograms of hatchery and naturally produced steelhead trout smelts collected at the Rock Island Dam bypass trap, 2 April - 24 June.

sockeye smelts had passed Rock Island Dam by 1 May (Appendix c-4) .

In 1988, the downstream migration of sockeye was not as strongly **bimodal** as in the previous three years (Appendix C-4). The usual **bimodal** run timing occurs because two stocks of sockeye pass Rock Island Dam on their seaward migration (**Okanogan** and Wenatchee rivers). Wenatchee River outmigrants pass Rock Island Dam primarily in April and **Okanogan** River smelts are more prevalent at Rock Island Dam in May (Peven 1987). It appears that in 1988, the Okanogan stock of sockeye did not migrate in **large** numbers (Peven 1988, Jim McGee, pers. **comm.**). Length frequencies were taken from sockeye smelts between 5 April and 3 June (Figure 8).

#### Coho

Daily collection of coho (**Oncorhynchus kisutch**) smelts began on 18 April and continued until 28 June. Sporadic samples of coho were collected after 27 June, with the last coho collected on 9 August . Peak passage of 2,244 coho smelts occurred on 22 May (Appendix A-2, C-5). The 10%, 50%, and 90% passage dates for coho were 13 May, 21 May, and 28 May, respectively.

#### Total **salmonid** run

The total juvenile **salmonid** run timing is represented in Appendix C-6. The early peak passage count of 3,572 on 2 May is largely influenced by the large collection of Wenatchee stock sockeye (n = 2,051). The 11 May peak count of 4,198 is the combination of **chinook** yearlings (n = 1,170) and steelhead (n = 1,869).

The effect of sub-yearling chinook was assessed on the 10%, 50%, and 90% dates for the total cumulative juvenile salmonid migration. A comparison was made between 1988 and the four year average (1985 - 1988 ) between the total juvenile population migrating past Rock Island Dam and the juvenile migration excluding sub-yearling chinook (Figures 9, 10). The duration of the middle 80% of the total juvenile **salmonid** passage (10% date to 90% date) was 75 days, 26 April to 9 July with a 50% passage date on 17 May, compared to a 70 day duration for the four year average, with 10%, 50%, and 90% passage dates: 25 April, 21 May, and 5 July, respectively (Figure 9). Excluding sub-yearling chinook from this analysis results in a spring migrant run duration of 32 days, 25 April to 26 May, with a 50% passage date on 13 May, compared to a 38 day duration for the four year average, with 10%, 50%, and 90% passage dates: 22 April, 17 May, and 29 May, respectively (Figure 10).

In summary, **sub-yearling** chinook extend the juvenile migration 90% passage **date 45 days; from 26 May (spring migration) to 9 July (total migration)**. Run timing in 1988 was slightly longer than the four year average. The middle 80% of the total juvenile **salmonid** migration past Rock Island Dam in 1988 was 75 days compared to 70 days for the four year average. Excluding sub-

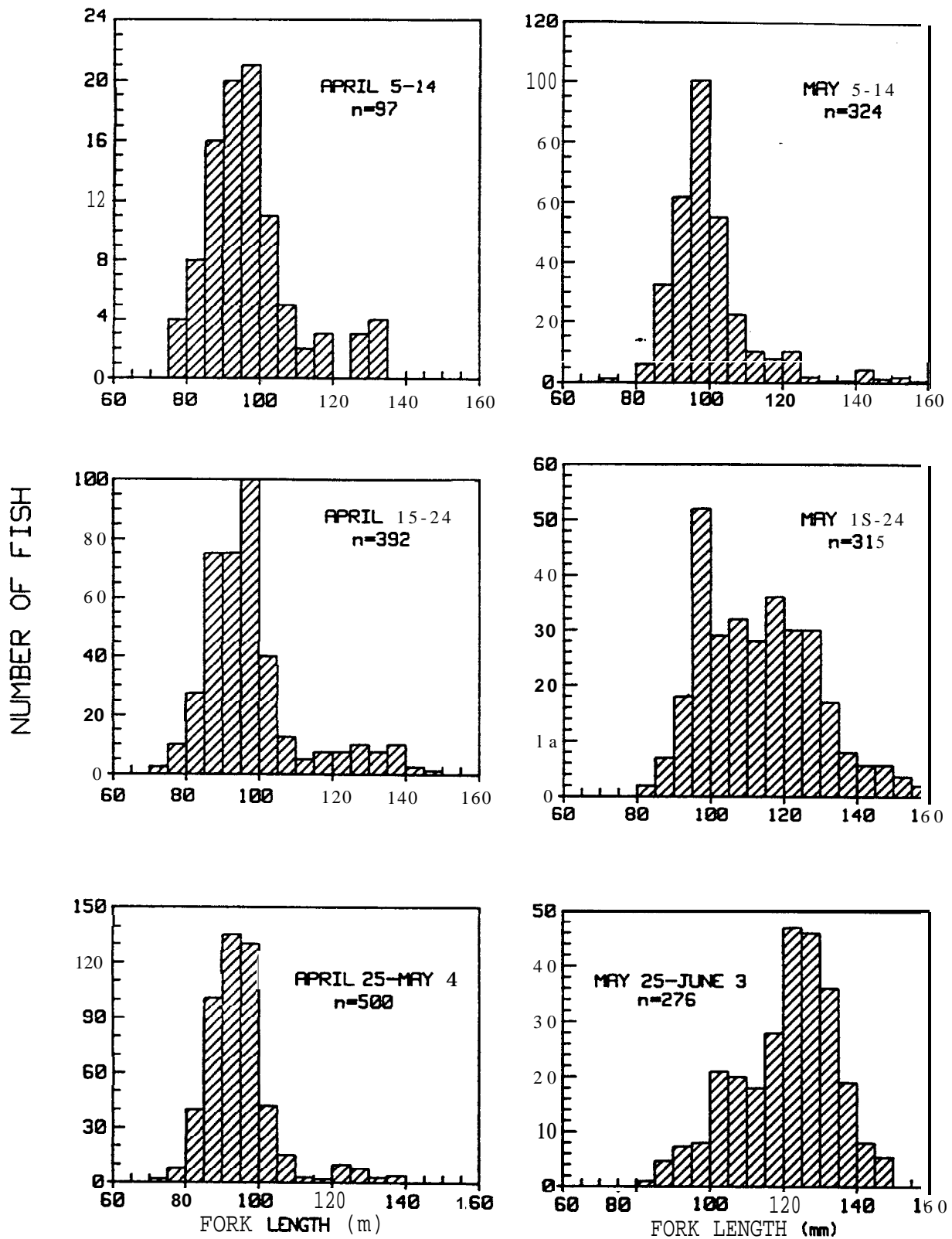


Figure 8. Length frequency histograms of sockeye smelts collected at the Rock Island Dam bypass trap, 5 April - 3 June (from Peven 1988).

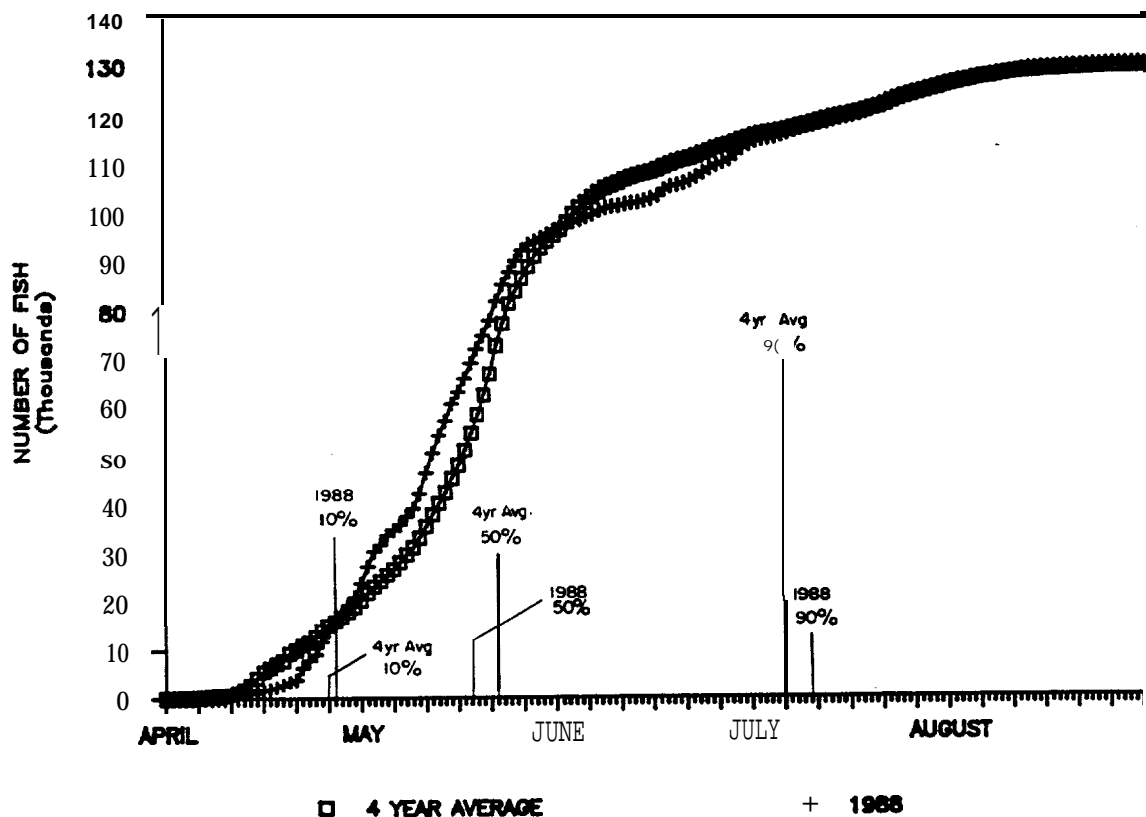


Figure 9. Comparison of cumulative total juvenile **salmonid** passage at rock Island Dam between 1988 and the 4 year average (1985-- 1988).

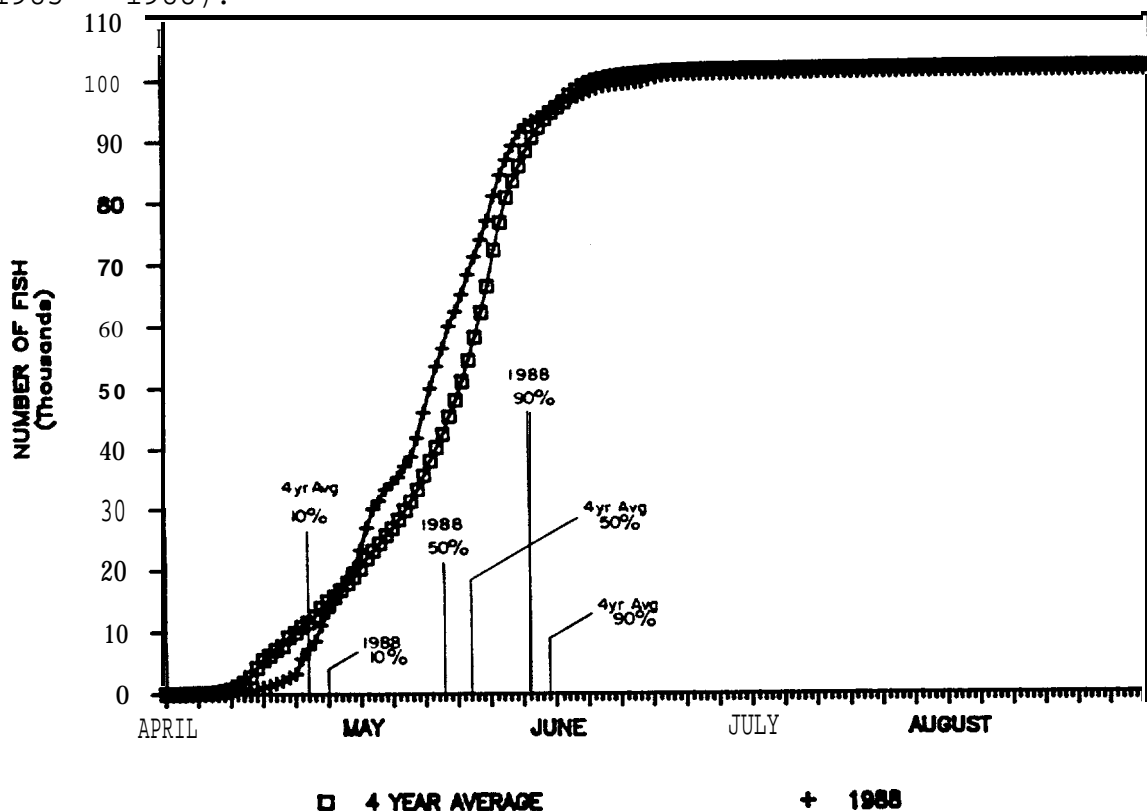


Figure 10. Comparison of cumulative juvenile **salmonid** passage (excluding sub-yearling chinook) at Rock Island Dam between 1988 and the 4 year average (1985 - 1988).

yearlings from this comparison, the spring migration past the dam in 1988 was 32 days, compared to 38 days for the four year average.

#### MARKED FISH RECOVERIES

Twenty five groups of freeze branded hatchery fish totaling 832,237 fish (Table 1), were released into the Columbia River system upstream from Rock Island Dam to evaluate the relationships between Columbia River flow rates and travel time. These releases consisted of 311,566 chinook yearlings (186,117 released from the Leavenworth National Fish Hatchery into the Wenatchee River, 32,172 released into the Entiat River, and the remainder released into the Methow River), 351,610 accelerated growth chinook sub-yearlings released from the Leavenworth hatchery, 99,061 sub-yearling chinook released at Wells Dam, 40,000 steelhead released into the Similkameen River, and 30,000 steelhead released into the Methow River. Table 1 presents information concerning these releases as well as recovery data, including: **first, last**, 10%, 50%, and 90% recovery dates and number and percent of each release group.

##### Yearling chinook

Leavenworth National Fish Hatchery - The first brand recovery at Rock Island Dam was on 22 April, consisting of the yearling chinook from Leavenworth National Fish Hatchery that were released on 20 April. The 50% recovery date at Rock Island Dam for the Leavenworth branded yearling spring chinook was 30 April, resulting in a median travel time of 10 days. Final recovery of Leavenworth branded chinook occurred on 19 May. The Rock Island Dam bypass trap sampled 0.45% of the fish in this release (Table 1). Other releases of yearling chinook from the Leavenworth hatchery were part of the Parametric experiment and had median passage dates ranging from 14 to 17 days (Table 1). These fish enter the Columbia River only 15 miles above Rock Island Dam and, as a result, Columbia River flows had less influence on travel time to Rock Island Dam for this group compared to fish released above Rocky Reach Dam.

##### Accelerated growth sub-yearling chinook

Twelve groups of accelerated growth chinook sub-yearlings were released from the Leavenworth hatchery; 8 groups on 22 April and 4 groups on 16 May. The groups that were released on 22 April had median passage dates ranging from 14 to 29 days, and the bypass trap collected between 0.98 to 1.17% of these fish (Table 1). The other groups that were released in May had median passage dates ranging from 23 to 24 days, and the bypass trap collected between 1.36 to 1.56% of these releases (Table 1).

Winthrop National Fish Hatchery - Four groups of yearling chinook were released into the Methow River on 19 April (Table 1). The median passage times for these four groups of fish were 23, 23, 26, and 33 days. The fish released into the Methow River traveled a longer distance before reaching Rock Island Dam than did the fish released into the Wenatchee River. The Rock Island Dam bypass trap sampled 0.39% - 0.57% of these released fish (Table 1).



### Sub-yearling chinook

One group of branded sub-yearling chinook was released from the WDF'S hatchery at Wells Dam on 22 May. The median travel time to Rock Island Dam for this group was 33 days and the Rock Island bypass trap collected 0.13% of the marked fish from this release (Table 1) . These fish had a shorter travel distance than the yearling chinook released in the Methow River.

### Steelhead

Marked steelhead were released on 18 April into the Similkameen River and 20 April into the Methow **River** (Table 1). Median travel times of the two groups of fish were 15 and 23 days, respectively. Steelhead migrated downstream faster than did chinook yearlings traveling about the same distance. Of the branded steelhead released, 1.27 and 1.67% were recovered at the Rock Island Dam bypass trap (Table 1).

## SUMMARY

**Between 2 April and 31 August, 1988, 129,781 downstream migrating salmonids** were collected **at** the Rock Island Dam bypass trap. Freeze branded fish collected consisted of 5,596 chinook salmon and 1,048 steelhead trout. In addition, 6,974 chinook and 21,693 steelhead were collected that had clipped adipose fins.

The middle 80% of the **salmonid outmigration** passed Rock Island Dam between 26 April and 9 July, 1988, a 75 day period. The dates and duration of the **outmigration** were extended by sub-yearling chinook. If sub-yearling chinook are excluded from analysis, the middle 80% of the outmigration was 25 April to 26 May, a 32 day period. Sub-yearling chinook comprised 22% of the fish collected at Rock Island Dam.

## ACKNOWLEDGMENTS

This monitoring effort was funded by the Bonneville Power Administration, U.S. Department of Energy, as a part of the Northwest Power Planning Council's program to protect, mitigate, and enhance fish and wildlife affected by hydroelectric facilities in the Columbia River Basin. The study was coordinated through the Fish Passage Center. Jennifer Jordan and Larry Basham of the Fish Passage Center were very helpful throughout the study. The Public Utility District No. 1 of **Chelan** County conducted the smelt monitoring at Rock Island Dam and a number of district employees assisted with the study. Dick Nason and Steve Hays provided administrative and logistical help as well as information and advise. Dale Newcomb prepared the report drawings. The following individuals assisted with the trap monitoring and data input into

the computer: N. Duree, E. Gocke, M. Hause, O. Heath, B. Keese, N. Mikkelsen, M. Miller, S. Nelson, K. Truscott, R. Yanak.

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## APPENDICES

- A-1 Daily samples from the Rock Island smelt monitoring program, April 1988.
- A-2 Daily samples from the Rock Island smelt monitoring program, May 1988.
- A-3 Daily samples from the Rock Island smelt monitoring program, June 1988.
- A-4 Daily samples from the Rock Island smelt monitoring program, **July** 1988.
- A-5 Daily samples from the Rock Island smelt monitoring program, August 1988.
- A-6 Monthly summary of the Rock Island smelt monitoring program, April - August 1988.
  
- B-1 Daily expanded counts from the Rock Island smelt monitoring program, April 1988.
- B-2 Daily expanded counts from the Rock Island smelt monitoring program, May 1988.
- B-3 Daily expanded counts from the Rock Island smelt monitoring program, June 1988.
- B-4 Daily expanded counts from the Rock Island smelt monitoring program, July 1988.
- B-5 Daily expanded counts from the Rock Island smelt monitoring program, August 1988.
- B-6 **Monthly summary** of the expanded counts of the Rock Island smelt monitoring program, April - **August** 1988.
  
- C-1 Chinook yearling run timing, Rock Island Dam, 2 April - 31 August, 1988.
- c-2 Chinook sub-yearling run timing, Rock Island Dam, 2 April - 31 August, 1988.
- c-3 Steelhead smelt run timing, Rock Island Dam, 2 April - 31 August, 1988.
- c-4. Coho smelt run timing, Rock Island Dam, 2 April - 31 August, **1988**.
- c-5. Sockeye smelt run timing, Rock Island Dam, 2 April - 31 August, 1988.
- C-6 Total juvenile **salmonid** run timing, Rock Island Dam, 2 April - 31 August.
  
- D-1 Daily summary of marked chinook and steelhead sampled from the Rock Island Dam bypass trap, April 1988.
- D-2 Daily summary of marked chinook and steelhead sampled from the Rock Island Dam bypass trap, May 1988.
- D-3 Daily summary of marked chinook and steelhead sampled from the Rock Island Dam bypass trap, June 1988.
- D-4 Daily summary of marked chinook and steelhead sampled from the Rock Island Dam bypass trap, July 1988.
- D-5 Daily summary of marked chinook and steelhead sampled from the Rock Island **Dam** bypass trap, August 1988.
- D-6 **Monthly** summary of marked chinook and steelhead sampled from the Rock Island Dam bypass trap, April - August 1988.

- E-1 Daily summary of branded accelerated growth sub-yearlings captured at the Rock Island Dam bypass trap, April, 1988.
- E-2 Daily summary of branded accelerated growth sub-yearlings captured at the Rock Island Dam bypass trap, May, 1988.
- E-3 Daily summary of branded accelerated growth sub-yearlings captured at the Rock Island Dam bypass trap, June, 1988.
- E-4 Daily summary of branded accelerated growth sub-yearlings captured at the Rock Island Dam bypass trap, July, 1988.
- E-5 Daily summary of branded accelerated growth sub-yearlings captured at the Rock Island Dam bypass trap, August, 1988.
- E-6 Monthly summary of branded accelerated growth sub-yearlings captured at the Rock Island Dam bypass trap, 2 April - 31 August .

Appendix A-1. Daily **salmonid** catch, Rock Island Dam bypass trap, April, 1988.

| STOP DATE/TIME         | CHINOOK CHINOOK |            |             | TOTAL     |                  | TOTAL<br>AGE 1 |
|------------------------|-----------------|------------|-------------|-----------|------------------|----------------|
|                        | YEARLING        | SUB-YEAR.  | STLHD.      | COHO      | SOCKEYE SALMONID |                |
| <b>04-01-88/0900</b>   | <b>0</b>        | <b>0</b>   | <b>0</b>    | <b>0</b>  | <b>0</b>         | <b>0</b>       |
| 04-02-88/0900          | 11              | 48         | 1           | 0         | 0                | 12             |
| 04-03-88/0900          | 9               | 15         | 2           | 0         | 0                | 11             |
| 04-04-88/0900          | 17              | 3          | 3           | 0         | 0                | 20             |
| 04-05-88/0900          | 14              | 16         | 3           | 0         | 1                | 18             |
| 04-06-88/0900          | 25              | 26         | 5           | 0         | 3                | 33             |
| 04-07-88/0900          | 20              | 134        | 4           | 0         | 3                | 27             |
| 04-08-88/0900          | 37              | 50         | 7           | 0         | 9                | 53             |
| 04-09-88/0900          | 34              | 57         | 5           | 0         | 12               | 51             |
| 04-10-88/0900          | 28              | 23         | 8           | 0         | 10               | 46             |
| 04-11-88/0900          | 49              | 13         | 3           | 0         | 25               | 77             |
| 04-12-88/0900          | 28              | 21         | 6           | 0         | 24               | 58             |
| 04-13-88/0900          | 71              | 16         | 7           | 0         | 11               | 89             |
| 04-14-88/0900          | 62              | 9          | 15          | 0         | 44               | 121            |
| 04-15-88/0900          | 87              | 28         | 29          | 0         | 94               | 210            |
| 04-16-88/0900          | 83              | 20         | 67          | 0         | 231              | 381            |
| 04-17-88/0900          | 99              | 113        | 81          | 0         | 57               | 237            |
| 04-18-88/0900          | 49              | 65         | 39          | 2         | 197              | 287            |
| 04-19-88/0900          | 112             | 75         | 72          | 3         | 265              | 452            |
| 04-20-88/0900          | 115             | 6          | 109         | 0         | 369              | 593            |
| 04-21-88/0900          | 74              | 5          | 56          | 0         | 408              | 538            |
| 04-22-88/0900          | 1421            | 2          | 185         | 5         | 916              | 2527           |
| 04-23-88/0900          | 1038            | 2          | 129         | 2         | 383              | 1552           |
| 04-24-88/0900          | 806             | 0          | 94          | 0         | 294              | 1194           |
| 04-25-88/0900          | 1473            | 2          | 152         | 2         | 975              | 2602           |
| 04-26-88/0900          | 1150            | 1          | 136         | 2         | 865              | 2153           |
| 04-27-88/0900          | 890             | 2          | 132         | 5         | 393              | 1420           |
| 04-28-88/0900          | 894             | 16         | 148         | 6         | 1109             | 2157           |
| 04-29-88/0900          | 1032            | 1          | 229         | 2         | 805              | 2068           |
| 04-30-88/0900          | 972             | 1          | 289         | 1         | 262              | 1524           |
| <b>Monthly totals:</b> | <b>10700</b>    | <b>770</b> | <b>2016</b> | <b>30</b> | <b>7765</b>      | <b>21281</b>   |

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Appendix A-2. Daily salmonid catch, Rock Island Dam bypass trap, May, 1988.

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| STOP DATE/TIME | CHINOOK<br>YEARLING | CHINOOK<br>SUB-YEAR. | STLHD. | COHO  | SOCKEYE | TOTAL<br>SALMONID | TOTAL<br>AGE 1 |
|----------------|---------------------|----------------------|--------|-------|---------|-------------------|----------------|
| 05-01-88/0900  | 1353                | 0                    | 447    | 5     | 1090    | 2895              | 2895           |
| 05-02-88/0900  | 968                 | 3                    | 547    | 3     | 2051    | 3572              | 3569           |
| 05-03-88/0900  | 1033                | 1                    | 1001   | 3     | 1071    | 3109              | 3108           |
| 05-04-88/0900  | 502                 | 0                    | 445    | 1     | 386     | 1334              | 1334           |
| 05-05-88/0900  | 883                 | 0                    | 867    | 1     | 194     | 1945              | 1945           |
| 05-06-88/0900  | 531                 | 7                    | 429    | 1     | 25      | 993               | 986            |
| 05-07-88/0900  | 613                 | 0                    | 450    | 8     | 42      | 1113              | 1113           |
| 05-08-88/0900  | 849                 | 0                    | 777    | 51    | 121     | 1798              | 1798           |
| 05-09-88/0900  | 606                 | 1                    | 768    | 35    | 134     | 1544              | 1543           |
| 05-10-88/0900  | 1159                | 2                    | 1263   | 241   | 395     | 3060              | 3058           |
| 05-11-88/0900  | 1170                | 3                    | 1869   | 628   | 528     | 4198              | 4195           |
| 05-12-88/0900  | 1294                | 3                    | 1619   | 883   | 167     | 3966              | 3963           |
| 05-13-88/0900  | 950                 | 7                    | 1403   | 992   | 221     | 3573              | 3566           |
| 05-14-88/0900  | 311                 | 8                    | 1698   | 751   | 174     | 2942              | 2934           |
| 05-15-88/0900  | 266                 | 3                    | 1754   | 1436  | 72      | 3531              | 3528           |
| 05-16-88/0900  | 267                 | 3                    | 1201   | 895   | 57      | 2423              | 2420           |
| 05-17-88/0900  | 246                 | 1                    | 1306   | 1127  | 54      | 2734              | 2732           |
| 05-18-88/0900  | 453                 | 0                    | 1149   | 1514  | 96      | 3212              | 3212           |
| 05-19-88/0900  | 676                 | 3                    | 864    | 1247  | 126     | 2916              | 2912           |
| 05-20-88/0900  | 586                 | 16                   | 417    | 1595  | 119     | 2733              | 2719           |
| 05-21-88/0900  | 768                 | 13                   | 578    | 1559  | 174     | 3092              | 3079           |
| 05-22-88/0900  | 1249                | 19                   | 431    | 2244  | 120     | 4063              | 4044           |
| 05-23-88/0900  | 823                 | 13                   | 326    | 2166  | 65      | 3393              | 3380           |
| 05-24-88/0900  | 389                 | 10                   | 266    | 1762  | 110     | 2537              | 2527           |
| 05-25-88/0900  | 445                 | 15                   | 217    | 1550  | 113     | 2340              | 2325           |
| 05-26-88/0900  | 722                 | 4                    | 148    | 1181  | 56      | 2111              | 2107           |
| 05-27-88/0900  | 433                 | 7                    | 128    | 645   | 43      | 1256              | 1249           |
| 05-28-88/0900  | 188                 | 5                    | 86     | 316   | 38      | 633               | 628            |
| 05-29-88/0900  | 113                 | 8                    | 67     | 333   | 59      | 580               | 572            |
| 05-30-88/0900  | 138                 | 26                   | 130    | 430   | 55      | 779               | 753            |
| 05-31-88/0900  | 232                 | 27                   | 152    | 255   | 90      | 756               | 729            |
| Montly totals: | 20216               | 208                  | 22803  | 23858 | 8046    | 75131             | 74923          |

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Appendix A-3. Daily salmonid catch, Rock Island Dam bypass trap, June, 1988.

| =====          |                     |                      |         |      |         |                   |                |
|----------------|---------------------|----------------------|---------|------|---------|-------------------|----------------|
| STOP DATE/TIME | CHINOOK<br>YEARLING | CHINOOK<br>SUB-YEAR. | STLHD . | COHO | SOCKEYE | TOTAL<br>SALMONID | TOTAL<br>AGE 1 |
| 06-01-88/0900  | 202                 | 70                   | 153     | 266  | 52      | 743               | 673            |
| 06-02-88/0900  | 186                 | 92                   | 105     | 150  | 19      | 552               | 460            |
| 06-03-88/0900  | 88                  | 61                   | 117     | 92   | 29      | 387               | 326            |
| 06-04-88/0900  | 144                 | 57                   | 105     | 112  | 42      | 460               | 403            |
| 06-05-88/0900  | 175                 | 122                  | 106     | 105  | 24      | 532               | 410            |
| 06-06-88/0900  | 258                 | 140                  | 75      | 82   | 16      | 571               | 431            |
| 06-07-88/0900  | 249                 | 284                  | 93      | 63   | 13      | 702               | 418            |
| 06-08-88/0900  | 176                 | 302                  | 64      | 73   | 11      | 626               | 324            |
| 06-09-88/0900  | 79                  | 133                  | 51      | 32   | 11      | 306               | 173            |
| 06-10-88/0900  | 14                  | 72                   | 43      | 13   | 1       | 143               | 71             |
| 06-11-88/0900  | 46                  | 153                  | 48      | 16   | 7       | 270               | 117            |
| 06-12-88/0900  | 54                  | 121                  | 72      | 20   | 8       | 275               | 154            |
| 06-13-88/0900  | 38                  | 92                   | 34      | 7    | 4       | 175               | 83             |
| 06-14-88/0900  | 116                 | 135                  | 25      | 32   | 6       | 314               | 179            |
| 06-15-88/0900  | 201                 | 135                  | 32      | 23   | 2       | 393               | 258            |
| 06-16-88/0900  | 336                 | 196                  | 31      | 35   | 3       | 601               | 405            |
| 06-17-88/0900  | 193                 | 883                  | 49      | 23   | 4       | 1152              | 269            |
| 06-18-88/0900  | 29                  | 551                  | 49      | 4    | 5       | 638               | 87             |
| 06-19-88/0900  | 5                   | 307                  | 20      | 1    | 3       | 336               | 29             |
| 06-20-88/0900  | 8                   | 314                  | 19      | 3    | 2       | 346               | 32             |
| 06-21-88/0900  | 19                  | 429                  | 17      | 8    | 4       | 477               | 48             |
| 06-22-88/0900  | 24                  | 660                  | 12      | 2    | 7       | 705               | 45             |
| 06-23-88/0900  | 10                  | 915                  | 4       | 0    | 3       | 942               | 27             |
| 06-24-88/0900  | 8                   | 755                  | 9       | 3    | 9       | 784               | 29             |
| 06-25-88/0900  | 3                   | 655                  | 8       | 7    | 5       | 678               | 23             |
| 06-26-88/0900  | 3                   | 509                  | 9       | 2    | 4       | 527               | 18             |
| 06-27-88/0900  | 5                   | 551                  | 3       | 1    | 7       | 567               | 16             |
| 06-28-88/0900  | 2                   | 977                  | 0       | 2    | 9       | 1000              | 23             |
| 06-29-88/0900  | 0                   | 1140                 | 4       | 0    | 4       | 1148              | 8              |
| 06-30-88/0900  | 0                   | 818                  | 10      | 0    | 4       | 832               | 14             |
| Montly totals: | 2671                | 11629                | 1387    | 1177 | 318     | 17182             | 5553           |
| =====          |                     |                      |         |      |         |                   |                |

Appendix A-4. Daily **salmonid** catch, Rock Island Dam bypass trap, July, 1988.

| CHINOOK CHINOOK |          |           |        | TOTAL |         | TOTAL |
|-----------------|----------|-----------|--------|-------|---------|-------|
| STOP DATE/TIME  | YEARLING | SUB-YEAR. | STLHD. | COHO  | SOCKEYE | AGE 1 |
| SALMONID        |          |           |        |       |         |       |
| 07-01-88/0900   | 0        | 599       | 4      | 1     | 6       | 610   |
| 07-02-88/0900   | 0        | 373       | 9      | 0     | 6       | 388   |
| 07-03-88/0900   | 0        | 265       | 1      | 0     | 2       | 268   |
| 07-04-88/0900   | 0        | 214       | 2      | 2     | 2       | 220   |
| 07-05-88/0900   | 0        | 441       | 9      | 0     | 2       | 452   |
| 07-06-88/0900   | 0        | 460       | 8      | 0     | 4       | 472   |
| 07-07-88/0900   | 0        | 472       | 4      | 0     | 4       | 480   |
| 07-08-88/0900   | 0        | 435       | 5      | 0     | 6       | 446   |
| 07-09-88/0900   | 0        | 394       | 2      | 0     | 4       | 400   |
| 07-10-88/0900   | 0        | 223       | 4      | 0     | 4       | 231   |
| 07-11-88/0900   | 0        | 291       | 8      | 0     | 9       | 308   |
| 07-12-88/0900   | 0        | 321       | 7      | 0     | 5       | 333   |
| 07-13-88/0900   | 1        | 362       | 3      | 0     | 7       | 373   |
| 07-14-88/0900   | 0        | 282       | 5      | 0     | 2       | 289   |
| 07-15-88/0900   | 0        | 263       | 4      | 0     | 2       | 269   |
| 07-16-88/0900   | 0        | 221       | 3      | 0     | 8       | 232   |
| 07-17-88/0900   | 0        | 343       | 2      | 0     | 2       | 347   |
| 07-18-88/0900   | 0        | 420       | 3      | 1     | 3       | 427   |
| 07-19-88/0900   | 0        | 709       | 4      | 0     | 3       | 716   |
| 07-20-88/0900   | 0        | 441       | 3      | 0     | 1       | 445   |
| 07-21-88/0900   | 0        | 603       | 5      | 3     | 7       | 618   |
| 07-22-88/0900   | 0        | 688       | 10     | 2     | 9       | 709   |
| 07-23-88/0900   | 0        | 405       | 1      | 1     | 3       | 410   |
| 07-24-88/0900   | 0        | 286       | 1      | 0     | 1       | 288   |
| 07-25-88/0900   | 0        | 276       | 1      | 0     | 1       | 278   |
| 07-26-88/0900   | 0        | 442       | 3      | 2     | 4       | 451   |
| 07-27-88/0900   | 1        | 487       | 5      | 2     | 2       | 497   |
| 07-28-88/0900   | 0        | 492       | 2      | 1     | 2       | 497   |
| 07-29-88/0900   | 0        | 324       | 1      | 2     | 2       | 329   |
| 07-30-88/0900   | 0        | 294       | 2      | 0     | 0       | 296   |
| 07-31-88/0900   | 0        | 280       | 0      | 0     | 1       | 281   |
| Montly totals:  | 2        | 11836     | 121    | 17    | 113     | 12089 |
| 253             |          |           |        |       |         |       |



Appendix A-5. Daily **salmonid** catch, Rock Island Dam bypass trap, August, 1988.

| STOP DATE/TIME  | CHINOOK<br>YEARLING | CHINOOK<br>SUB-YEAR. | STLHD . | COHO | SOCKEYE | TOTAL<br>SALMONID | TOTAL<br>AGE 1 |
|-----------------|---------------------|----------------------|---------|------|---------|-------------------|----------------|
| 08-01-88/0900   | 0                   | 210                  | 1       | 0    | 1       | 212               | 2              |
| 08-02-88/0900   | 0                   | 229                  | 0       | 0    | 0       | 229               | 0              |
| 08-03-88/0900   | 0                   | 281                  | 1       | 2    | 3       | 287               | 6              |
| 08-04-88/0900   | 0                   | 335                  | 0       | 0    | 4       | 339               | 4              |
| 08-05-88/0900   | 0                   | 240                  | 1       | 3    | 5       | 249               | 9              |
| 08-06-88/0900   | 0                   | 235                  | 1       | 0    | 2       | 238               | 3              |
| 08-07-88/0900   | 0                   | 181                  | 0       | 1    | 5       | 187               | 6              |
| 08-08-88/0900   | 0                   | 169                  | 0       | 0    | 0       | 169               | 0              |
| 08-09-88/0900   | 0                   | 205                  | 0       | 1    | 0       | 206               | 1              |
| 08-10-88/0900   | 0                   | 231                  | 1       | 0    | 1       | 233               | 2              |
| 08-11-88/0900   | 0                   | 291                  | 1       | 0    | 1       | 293               | 2              |
| 08-12-88/0900   | 0                   | 247                  | 0       | 0    | 1       | 248               | 1              |
| 08-13-88/0900   | 0                   | 85                   | 0       | 0    | 0       | 85                | 0              |
| 08-14-88/0900   | 0                   | 64                   | 0       | 0    | 0       | 64                | 0              |
| 08-15-88/0900   | 0                   | 66                   | 1       | 0    | 0       | 67                | 1              |
| 08-16-88/0900   | 0                   | 95                   | 0       | 0    | 0       | 95                | 0              |
| 08-17-88/0900   | 0                   | 75                   | 0       | 0    | 1       | 76                | 1              |
| 08-18-88/0900   | 0                   | 99                   | 0       | 0    | 0       | 99                | 0              |
| 08-19-88/0900   | 0                   | 104                  | 1       | 0    | 1       | 106               | 2              |
| 08-20-88/0900   | 0                   | 83                   | 0       | 0    | 1       | 84                | 1              |
| 08-21-88/0900   | 0                   | 66                   | 0       | 0    | 0       | 66                | 0              |
| 08-22-88/0900   | 0                   | 31                   | 0       | 0    | 0       | 31                | 0              |
| 08-23-88/0900   | 0                   | 70                   | 0       | 0    | 0       | 70                | 0              |
| 08-24-88/0900   | 0                   | 98                   | 1       | 0    | 0       | 99                | 1              |
| 08-25-88/0900   | 0                   | 76                   | 0       | 0    | 0       | 76                | 0              |
| 08-26-88/0900   | 0                   | 52                   | 0       | 0    | 0       | 52                | 0              |
| 08-27-88/0900   | 0                   | 47                   | 1       | 0    | 1       | 49                | 2              |
| 08-28-88/0900   | 0                   | 26                   | 0       | 0    | 1       | 27                | 1              |
| 08-29-88/0900   | 0                   | 25                   | 0       | 0    | 0       | 25                | 0              |
| 08-30-88/0900   | 0                   | 37                   | 0       | 0    | 0       | 37                | 0              |
| 08-31-88/0900   | 0                   | 47                   | 0       | 0    | 0       | 47                | 0              |
| Monthly totals: | 0                   | 4053                 | 10      | 7    | 28      | 4098              | 45             |

Appendix A-6. Monthly summary of catches from the Rock Island Dam bypass trap, 1988.

| MONTH          | CHINOOK<br>YEARLING | CHINOOK<br>SUB-YEAR. | STLHD . | COHO  | SOCKEYE | TOTAL<br>SALMONID | TOTAL<br>AGE 1 |
|----------------|---------------------|----------------------|---------|-------|---------|-------------------|----------------|
| April          | 10700               | 770                  | 2016    | 30    | 7765    | 21281             | 20511          |
| May            | 20216               | 208                  | 22803   | 23858 | 8046    | 75131             | 74923          |
| June           | 2671                | 11629                | 1387    | 1177  | 318     | 17182             | 5553           |
| July           | 2                   | 11836                | 121     | 17    | 113     | 12089             | 253            |
| August         | 0                   | 4053                 | 10      | 7     | 28      | 4098              | 45             |
| Yearly totals: | 33589               | 28496                | 26337   | 25089 | 16270   | 129781            | 101285         |

Appendix B-1. Expanded Rock Island Dam bypass trap counts, April, 1988.

| =====           |          |           |                 |      |         |           | TOTAL |
|-----------------|----------|-----------|-----------------|------|---------|-----------|-------|
| CHINOOK CHINOOK |          |           | TOTAL SALMONIDS |      |         |           | AGE 1 |
| STOP DATE/TIME  | YEARLING | SUB-YEAR. | STLHD.          | COHO | SOCKEYE | SALMONIDS |       |
| 04-01-88/0900   | 0        | 0         | 0               | 0    | 0       | 0         | 0     |
| 04-02-88/0900   | 14       | 63        | 1               | 0    | 0       | 79        | 16    |
| 04-03-88/0900   | 11       | 18        | 2               | 0    | 0       | 31        | 13    |
| 04-04-88/0900   | 19       | 3         | 3               | 0    | 0       | 25        | 22    |
| 04-05-88/0900   | 18       | 21        | 4               | 0    | 1       | 44        | 23    |
| 04-06-88/0900   | 33       | 34        | 7               | 0    | 4       | 78        | 44    |
| 04-07-88/0900   | 29       | 193       | 6               | 0    | 4       | 231       | 38    |
| 04-08-88/0900   | 49       | 66        | 9               | 0    | 12      | 136       | 70    |
| 04-09-88/0900   | 41       | 70        | 6               | 0    | 15      | 132       | 62    |
| 04-10-88/0900   | 30       | 25        | 9               | 0    | 11      | 75        | 50    |
| 04-11-88/0900   | 55       | 15        | 3               | 0    | 28      | 101       | 86    |
| 04-12-88/0900   | 37       | 28        | 8               | 0    | 32      | 104       | 76    |
| 04-13-88/0900   | 93       | 21        | 9               | 0    | 14      | 138       | 117   |
| 04-14-88/0900   | 84       | 12        | 20              | 0    | 60      | 176       | 164   |
| 04-15-88/0900   | 126      | 41        | 42              | 0    | 137     | 346       | 305   |
| 04-16-88/0900   | 108      | 26        | 87              | 0    | 300     | 521       | 495   |
| 04-17-88/0900   | 113      | 129       | 93              | 0    | 65      | 400       | 271   |
| 04-18-88/0900   | 55       | 73        | 44              | 2    | 221     | 394       | 321   |
| 04-19-88/0900   | 153      | 103       | 98              | 4    | 362     | 721       | 618   |
| 04-20-88/0900   | 128      | 7         | 121             | 0    | 411     | 667       | 660   |
| 04-21-88/0900   | 98       | 7         | 74              | 0    | 541     | 720       | 713   |
| 04-22-88/0900   | 1819     | 3         | 237             | 6    | 1172    | 3237      | 3234  |
| 04-23-88/0900   | 1425     | 3         | 177             | 3    | 526     | 2134      | 2131  |
| 04-24-88/0900   | 1111     | 0         | 130             | 0    | 405     | 1645      | 1645  |
| 04-25-88/0900   | 2025     | 3         | 209             | 3    | 1341    | 3581      | 3578  |
| 04-26-88/0900   | 1757     | 2         | 208             | 3    | 1322    | 3292      | 3290  |
| 04-27-88/0900   | 1449     | 3         | 215             | 8    | 640     | 2315      | 2312  |
| 04-28-88/0900   | 1329     | 24        | 220             | 9    | 1648    | 3230      | 3206  |
| 04-29-88/0900   | 1360     | 1         | 302             | 3    | 1061    | 2727      | 2726  |
| 04-30-88/0900   | 1338     | 1         | 398             | ?    | 361     | 2100      | 2099  |
| Monthly totals: | 14907    | 995       | 2742            | 42   | 10694   | 29380     | 28385 |
| =====           |          |           |                 |      |         |           |       |

Appendix B-2. Expanded Rock Island Dam bypass trap counts, May, 1988.

| STOP DATE/TIME | CHINOOK CHINOOK |           |        | TOTAL SALMONIDS |         |           | TOTAL  |
|----------------|-----------------|-----------|--------|-----------------|---------|-----------|--------|
|                | YEARLING        | SUB-YEAR. | STLHD. | COHO            | SOCKEYE | SALMONIDS | AGE 1  |
| 05-01-88/0900  | 1944            | 0         | 642    | 7               | 1566    | 4160      | 4160   |
| 05-02-88/0900  | 1418            | 4         | 801    | 4               | 3004    | 5231      | 5227   |
| 05-03-88/0900  | 1785            | 2         | 1730   | 5               | 1851    | 5373      | 5371   |
| 05-04-88/0900  | 752             | 0         | 667    | 1               | 578     | 1999      | 1999   |
| 05-05-88/0900  | 1438            | 0         | 1412   | 2               | 316     | 3168      | 3168   |
| 05-06-88/0900  | 790             | 10        | 639    | 1               | 37      | 1478      | 1468   |
| 05-07-88/0900  | 857             | 0         | 629    | 11              | 59      | 1557      | 1557   |
| 05-08-88/0900  | 1091            | 0         | 998    | 66              | 155     | 2309      | 2309   |
| 05-09-88/0900  | 753             | 1         | 954    | 43              | 166     | 1918      | 1917   |
| 05-10-88/0900  | 1928            | 3         | 2101   | 401             | 657     | 5091      | 5088   |
| 05-11-88/0900  | 2364            | 6         | 3776   | 1269            | 1067    | 8482      | 8476   |
| 05-12-88/0900  | 2530            | 6         | 3165   | 1726            | 327     | 7754      | 7748   |
| 05-13-88/0900  | 1893            | 14        | 2796   | 1977            | 440     | 7121      | 7107   |
| 05-14-88/0900  | 630             | 16        | 3440   | 1522            | 353     | 5961      | 5945   |
| 05-15-88/0900  | 463             | 5         | 3055   | 2501            | 125     | 6151      | 6146   |
| 05-16-88/0900  | 437             | 5         | 1967   | 1466            | 93      | 3968      | 3963   |
| 05-17-88/0900  | 486             | 4         | 2590   | 2235            | 107     | 5421      | 5417   |
| 05-18-88/0900  | 698             | 0         | 1769   | 2331            | 148     | 4946      | 4946   |
| 05-19-88/0900  | 1033            | 6         | 1323   | 1909            | 193     | 4464      | 4458   |
| 05-20-88/0900  | 1036            | 25        | 734    | 2809            | 210     | 4813      | 4788   |
| 05-21-88/0900  | 1365            | 23        | 1028   | 2772            | 309     | 5497      | 5474   |
| 05-22-88/0900  | 1950            | 30        | 673    | 3503            | 187     | 6342      | 6312   |
| 05-23-88/0900  | 1193            | 19        | 472    | 3138            | 94      | 4916      | 4897   |
| 05-24-88/0900  | 721             | 19        | 493    | 3264            | 204     | 4699      | 4680   |
| 05-25-88/0900  | 853             | 29        | 416    | 2972            | 217     | 4486      | 4457   |
| 05-26-88/0900  | 1258            | 7         | 258    | 2058            | 98      | 3679      | 3672   |
| 05-27-88/0900  | 747             | 12        | 221    | 1113            | 74      | 2168      | 2156   |
| 05-28-88/0900  | 228             | 6         | 104    | 383             | 46      | 767       | 761    |
| 05-29-88/0900  | 147             | 10        | 87     | 434             | 77      | 755       | 745    |
| 05-30-88/0900  | 151             | 28        | 142    | 471             | 60      | 853       | 825    |
| 05-31-88/0900  | 279             | 33        | 183    | 307             | 108     | 910       | 877    |
| Montly totals: | 33218           | 323       | 39265  | 40701           | 12926   | 126437    | 126114 |

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Appendix B-3. Expanded Rock Island Dam bypass trap counts, June, 1988.

|                |          |           |         |      |         |           | TOTAL           |
|----------------|----------|-----------|---------|------|---------|-----------|-----------------|
|                |          | CHINOOK   | CHINOOK |      |         |           | TOTAL SALMONIDS |
| STOP DATE/TIME | YEARLING | SUB-YEAR. | STLHD.  | COHO | SOCKEYE | SALMONIDS | AGE 1           |
| 06-01-88/0900  | 313      | 108       | 237     | 412  | 81      | 1150      | 1042            |
| 06-02-88/0900  | 313      | 155       | 177     | 253  | 32      | 929       | 774             |
| 06-03-88/0900  | 151      | 105       | 201     | 158  | 50      | 665       | 560             |
| 06-04-88/0900  | 228      | 90        | 166     | 177  | 67      | 729       | 639             |
| 06-05-88/0900  | 231      | 161       | 140     | 139  | 32      | 703       | 542             |
| 06-06-88/0900  | 367      | 199       | 107     | 117  | 23      | 813       | 614             |
| 06-07-88/0900  | 370      | 422       | 138     | 94   | 19      | 1043      | 621             |
| 06-08-88/0900  | 269      | 462       | 98      | 112  | 17      | 958       | 496             |
| 06-09-88/0900  | 125      | 211       | 81      | 51   | 17      | 485       | 274             |
| 06-10-88/0900  | 20       | 104       | 62      | 19   | 1       | 207       | 103             |
| 06-11-88/0900  | 53       | 177       | 56      | 19   | 8       | 312       | 135             |
| 06-12-88/0900  | 58       | 130       | 78      | 22   | 9       | 296       | 166             |
| 06-13-88/0900  | 41       | 99        | 37      | 8    | 4       | 188       | 89              |
| 06-14-88/0900  | 168      | 195       | 36      | 46   | 9       | 454       | 259             |
| 06-15-88/0900  | 274      | 184       | 44      | 31   | 3       | 535       | 351             |
| 06-16-88/0900  | 506      | 295       | 47      | 53   | 5       | 905       | 610             |
| 06-17-88/0900  | 275      | 1260      | 70      | 33   | 6       | 1644      | 384             |
| 06-18-88/0900  | 42       | 791       | 70      | 6    | 7       | 916       | 125             |
| 06-19-88/0900  | 5        | 327       | 21      | 1    | 3       | 357       | 30              |
| 06-20-88/0900  | 9        | 334       | 20      | 3    | 2       | 369       | 35              |
| 06-21-88/0900  | 28       | 634       | 25      | 12   | 6       | 705       | 71              |
| 06-22-88/0900  | 34       | 934       | 17      | 3    | 10      | 998       | 64              |
| 06-23-88/0900  | 15       | 1355      | 21      | 0    | 4       | 1395      | 40              |
| 06-24-88/0900  | 12       | 1147      | 14      | 5    | 14      | 1191      | 44              |
| 06-25-88/0900  | 4        | 975       | 12      | 10   | 7       | 1010      | 35              |
| 06-26-88/0900  | 4        | 608       | 11      | 2    | 5       | 629       | 21              |
| 06-27-88/0900  | 6        | 673       | 4       | 1    | 9       | 692       | 19              |
| 06-28-88/0900  | 2        | 1188      | 12      | 2    | 11      | 1216      | 28              |
| 06-29-88/0900  | 0        | 2020      | 7       | 0    | 7       | 2034      | 14              |
| 06-30-88/0900  | 0        | 995       | 12      | 0    | 5       | 1012      | 17              |
| Montly totals: | 3923     | 16338     | 2021    | 1789 | 473     | 24540     | 8202            |

Appendix B-4. Expanded Rock Island Dam bypass trap counts, July, 1988.

| =====          |           |                 |           |        |              |           |       |
|----------------|-----------|-----------------|-----------|--------|--------------|-----------|-------|
|                |           | CHINOOK CHINOOK |           |        |              | TOTAL     |       |
| STOP           | DATE/TIME | YEARLING        | SUB-YEAR. | STLHD. | COHO SOCKEYE | SALMONIDS | AGE 1 |
| =====          |           |                 |           |        |              |           |       |
| 07-01-88/0900  | 0         | 829             | 6         | 1      | 8            | 844       | 15    |
| 07-02-88/0900  | 0         | 463             | 11        | 0      | 7            | 482       | 19    |
| 07-03-88/0900  | 0         | 287             | 1         | 0      | 2            | 290       | 3     |
| 07-04-88/0900  | 0         | 233             | 2         | 2      | 2            | 239       | 6     |
| 07-05-88/0900  | 0         | 485             | 10        | 0      | 2            | 497       | 12    |
| 07-06-88/0900  | 0         | 712             | 12        | 0      | 6            | 730       | 18    |
| 07-07-88/0900  | 0         | 567             | 5         | 0      | 5            | 577       | 10    |
| 07-08-88/0900  | 0         | 525             | 6         | 0      | 7            | 538       | 13    |
| 07-09-88/0900  | 0         | 558             | 3         | 0      | 6            | 567       | 9     |
| 07-10-88/0900  | 0         | 267             | 5         | 0      | 5            | 276       | 9     |
| 07-11-88/0900  | 0         | 317             | 9         | 0      | 10           | 335       | 18    |
| 07-12-88/0900  | 0         | 493             | 11        | 0      | 8            | 512       | 19    |
| 07-13-88/0900  | 1         | 519             | 4         | 0      | 10           | 535       | 16    |
| 07-14-88/0900  | 0         | 395             | 7         | 0      | 3            | 404       | 9     |
| 07-15-88/0900  | 0         | 333             | 5         | 0      | 3            | 341       | 8     |
| 07-16-88/0900  | 0         | 292             | 4         | 0      | 11           | 307       | 15    |
| 07-17-88/0900  | 0         | 383             | 2         | 0      | 2            | 388       | 5     |
| 07-18-88/0900  | 0         | 476             | 3         | 1      | 3            | 484       | 8     |
| 07-19-88/0900  | 0         | 1017            | 6         | 0      | 4            | 1027      | 10    |
| 07-20-88/0900  | 0         | 605             | 4         | 0      | 1            | 611       | 6     |
| 07-21-88/0900  | 0         | 865             | 7         | 4      | 10           | 887       | 22    |
| 07-22-88/0900  | 0         | 1024            | 15        | 3      | 13           | 1056      | 32    |
| 07-23-88/0900  | 0         | 639             | 2         | 2      | 5            | 646       | 7     |
| 07-24-88/0900  | 0         | 323             | 1         | 0      | 1            | 325       | 2     |
| 07-25-88/0900  | 0         | 279             | 1         | 0      | 1            | 281       | 2     |
| 07-26-88/0900  | 0         | 582             | 4         | 3      | 5            | 594       | 12    |
| 07-27-88/0900  | 1         | 657             | 7         | 3      | 3            | 671       | 14    |
| 07-28-88/0900  | 0         | 651             | 3         | 1      | 3            | 658       | 7     |
| 07-29-88/0900  | 0         | 368             | 1         | 2      | 2            | 374       | 6     |
| 07-30-88/0900  | 0         | 370             | 3         | 0      | 0            | 373       | 3     |
| 07-31-88/0900  | 0         | 293             | 0         | 0      | 1            | 294       | 1     |
| =====          |           |                 |           |        |              |           |       |
| Montly totals: | 2         | 15807           | 160       | 22     | 149          | 16143     | 336   |
| =====          |           |                 |           |        |              |           |       |

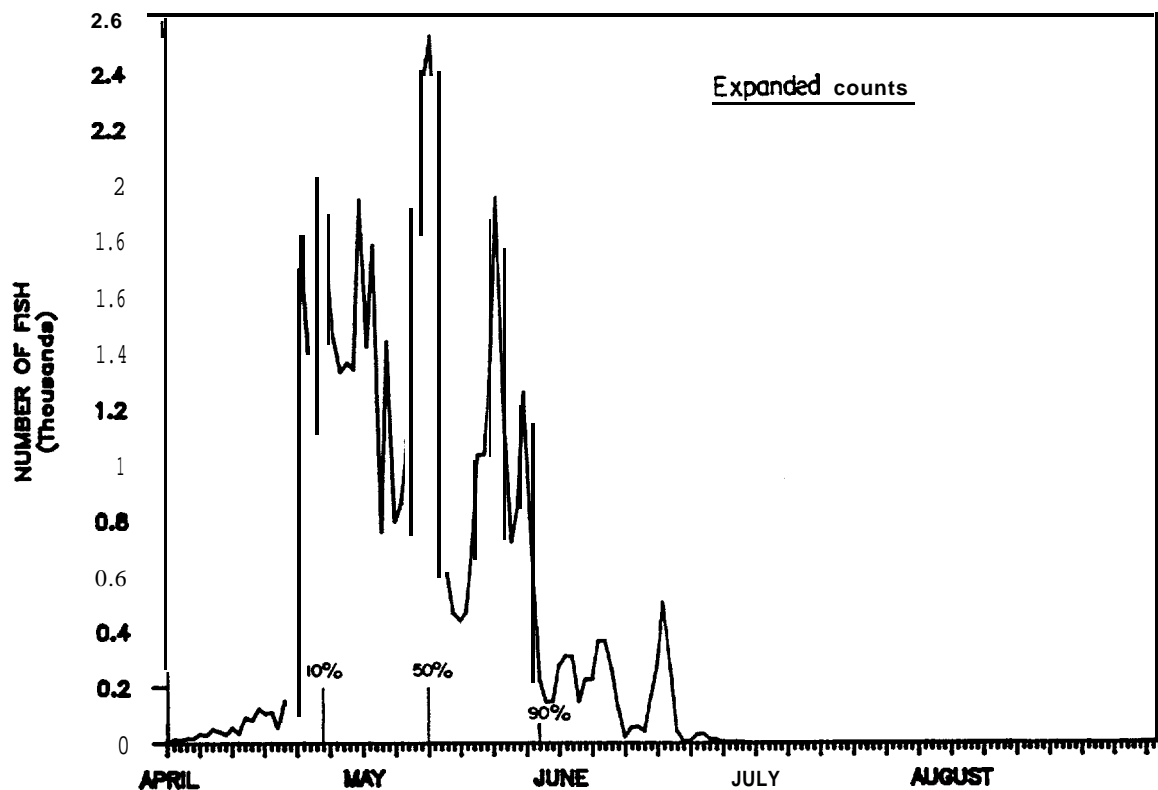
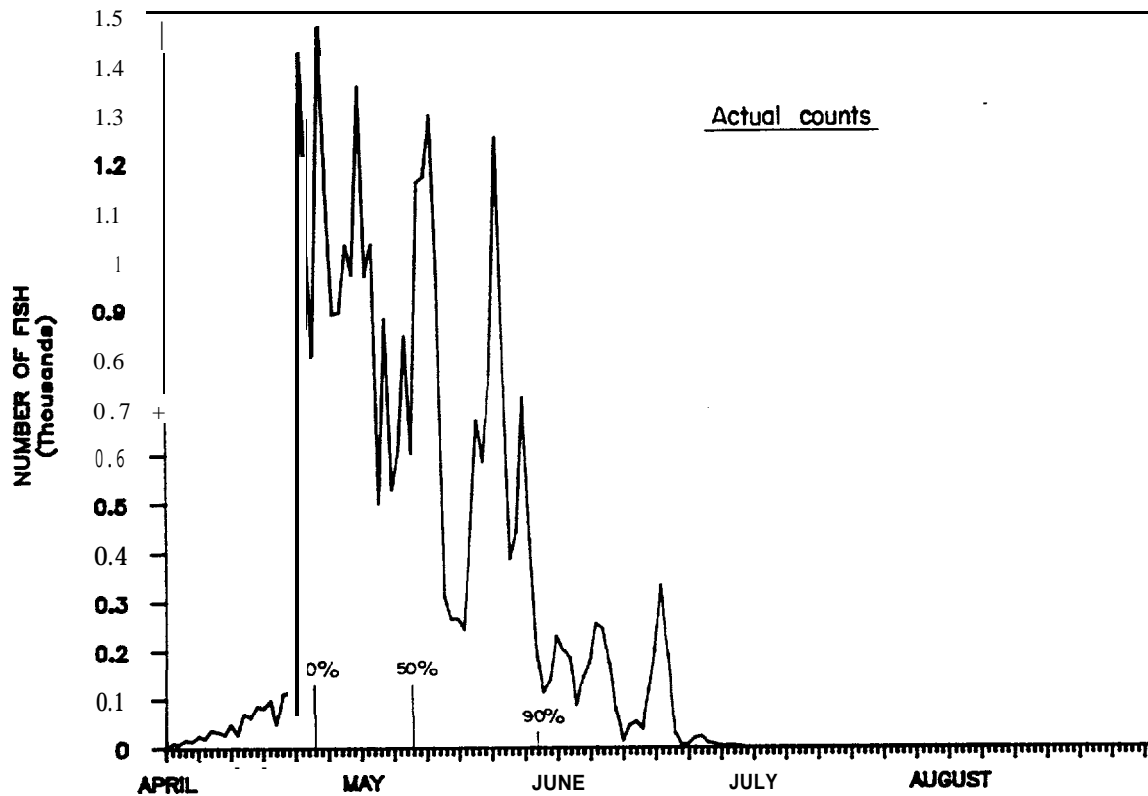
Appendix B-5. Expanded Rock Island Dam bypass trap counts, August, 1988.

| STOP DATE/TIME  | CHINOOK CHINOOK |           |        | TOTAL |         |           | TOTAL SALMONIDS AGE 1 |
|-----------------|-----------------|-----------|--------|-------|---------|-----------|-----------------------|
|                 | YEARLING        | SUB-YEAR. | STLHD. | COHO  | SOCKEYE | SALMONIDS |                       |
| 08-01-88/0900   | 0               | 225       | 1      | 0     | 1       | 227       | 2                     |
| 08-02-88/0900   | 0               | 281       | 0      | 0     | 0       | 281       | 0                     |
| 08-03-88/0900   | 0               | 329       | 1      | 2     | 4       | 336       | 7                     |
| 08-04-88/0900   | 0               | 398       | 0      | 0     | 5       | 403       | 5                     |
| 08-05-88/0900   | 0               | 261       | 1      | 3     | 5       | 271       | 10                    |
| 08-06-88/0900   | 0               | 280       | 1      | 0     | 2       | 284       | 4                     |
| 08-07-88/0900   | 0               | 183       | 0      | 1     | 5       | 189       | 6                     |
| 08-08-88/0900   | 0               | 171       | 0      | 0     | 0       | 171       | 0                     |
| 08-09-88/0900   | 0               | 244       | 0      | 1     | 0       | 246       | 2                     |
| 08-10-88/0900   | 0               | 306       | 1      | 0     | 1       | 308       | 2                     |
| 08-11-88/0900   | 0               | 375       | 1      | 0     | 1       | 378       | 3                     |
| 08-12-88/0900   | 0               | 306       | 0      | 0     | 1       | 308       | 2                     |
| 08-13-88/0900   | 0               | 89        | 0      | 0     | 0       | 89        | 0                     |
| 08-14-88/0900   | 0               | 65        | 0      | 0     | 0       | 65        | 0                     |
| 08-15-88/0900   | 0               | 67        | 1      | 0     | 0       | 68        | 1                     |
| 08-16-88/0900   | 0               | 111       | 0      | 0     | 0       | 111       | 0                     |
| 08-17-88/0900   | 0               | 87        | 0      | 0     | 1       | 88        | 1                     |
| 08-18-88/0900   | 0               | 100       | 0      | 0     | 0       | 100       | 0                     |
| 08-19-88/0900   | 0               | 126       | 1      | 0     | 1       | 128       | 2                     |
| 08-20-88/0900   | 0               | 111       | 0      | 0     | 1       | 112       | 1                     |
| 08-21-88/0900   | 0               | 68        | 0      | 0     | 0       | 68        | 0                     |
| 08-22-88/0900   | 0               | 31        | 0      | 0     | 0       | 31        | 0                     |
| 08-23-88/0900   | 0               | 95        | 0      | 0     | 0       | 95        | 0                     |
| 08-24-88/0900   | 0               | 118       | 1      | 0     | 0       | 119       | 1                     |
| 08-25-88/0900   | 0               | 101       | 0      | 0     | 0       | 101       | 0                     |
| 08-26-88/0900   | 0               | 76        | 0      | 0     | 0       | 76        | 0                     |
| 08-27-88/0900   | 0               | 62        | 1      | 0     | 1       | 65        | 3                     |
| 08-28-88/0900   | 0               | 29        | 0      | 0     | 1       | 31        | 2                     |
| 08-29-88/0900   | 0               | 27        | 0      | 0     | 0       | 27        | 0                     |
| 08-30-88/0900   | 0               | 51        | 0      | 0     | 0       | 51        | 0                     |
| 08-31-88/0900   | 0               | 65        | 0      | 0     | 0       | 65        | 0                     |
| Monthly totals: | 0               | 4838      | 10     | 7     | 30      | 4892      | 54                    |

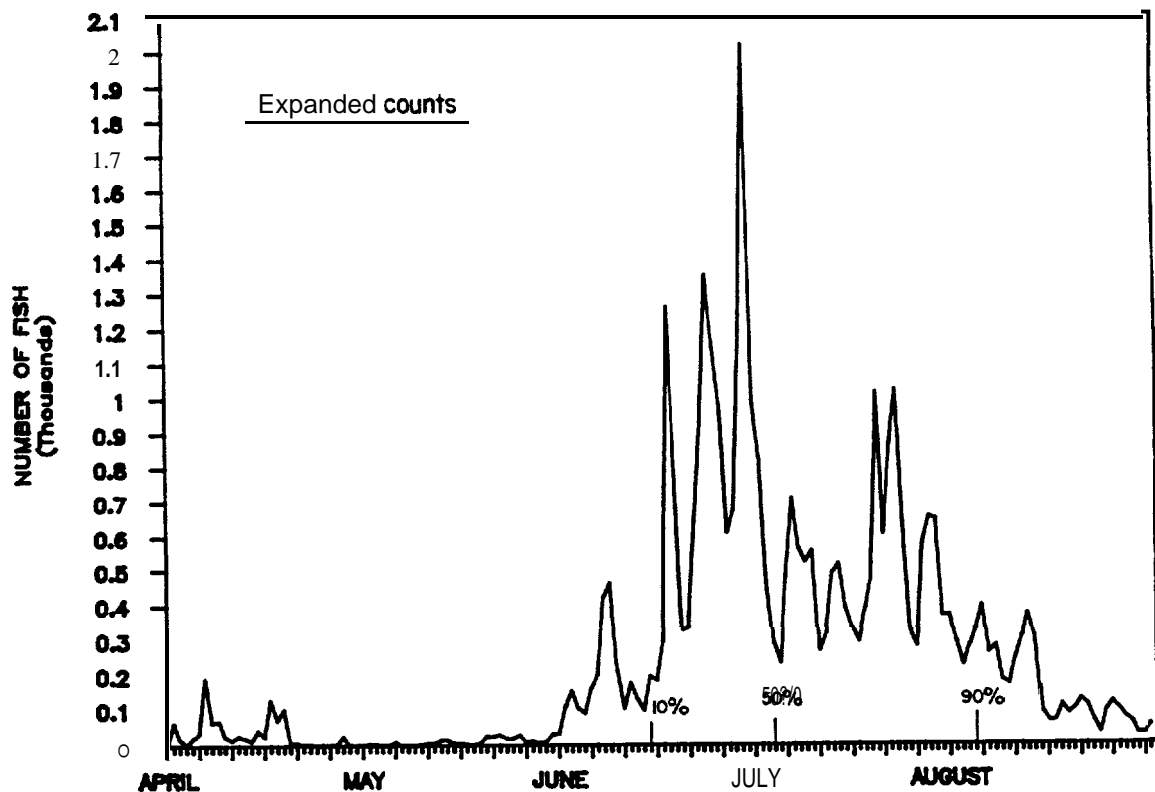
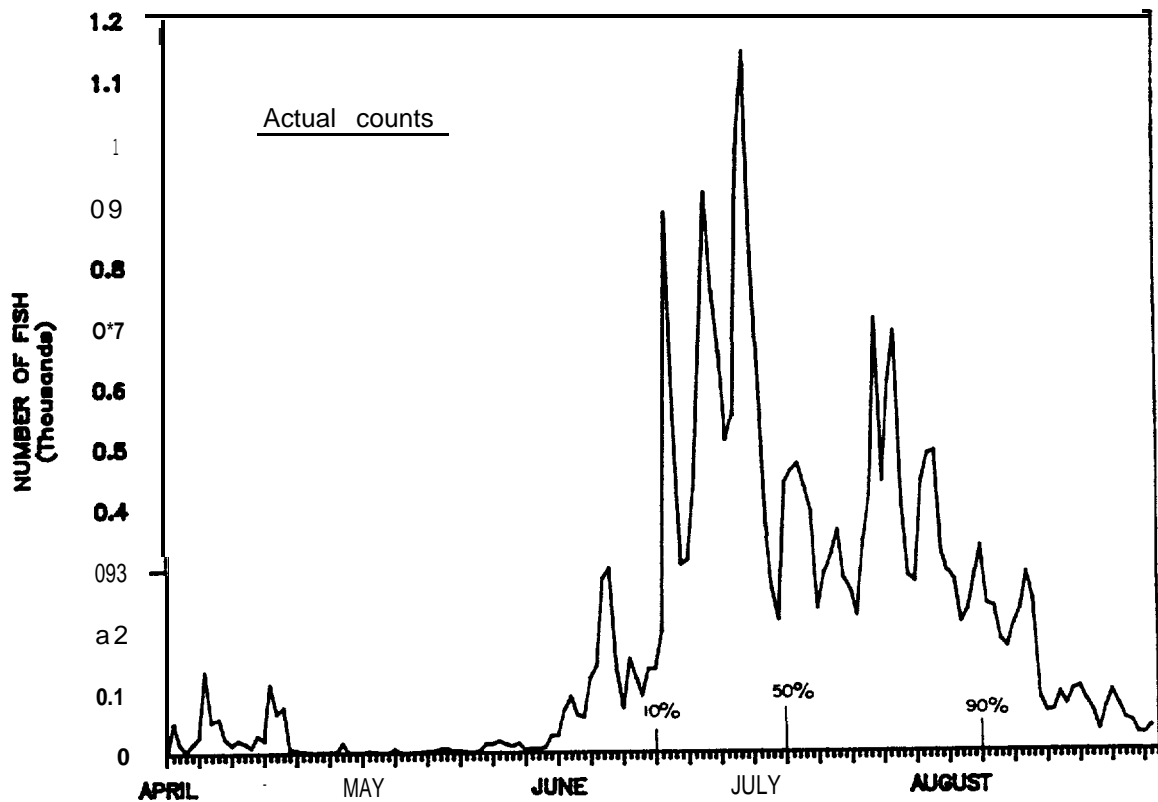
Appendix B-6. Monthly summary of expanded catches from the Rock Island Dam  
bypass trap, 1988.

| MONTH          | CHINOOK<br>YEARLING | CHINOOK<br>SUB-YEAR. | STLHD.       | COHO         | SCKEYE       | TOTAL<br>SALMONIDS | TOTAL<br>SALMONIDS |
|----------------|---------------------|----------------------|--------------|--------------|--------------|--------------------|--------------------|
|                |                     |                      |              |              |              |                    | AGE 1              |
| <b>April</b>   | 14907               | 995                  | 2742         | 42           | 10694        | 29380              | 28385              |
| May            | <b>33218</b>        | <b>323</b>           | <b>39265</b> | <b>40701</b> | <b>12926</b> | <b>126437</b>      | <b>126114</b>      |
| June           | <b>3923</b>         | <b>16338</b>         | <b>2021</b>  | <b>1789</b>  | <b>473</b>   | <b>24540</b>       | <b>8202</b>        |
| July           | 2                   | 15807                | 160          | 22           | <b>149</b>   | 16143              | 336                |
| <b>August</b>  | o                   | 4838                 | 10           | 7            | 30           | 4892               | 54                 |
| Yearly totals: | <b>52050</b>        | <b>38301</b>         | <b>44198</b> | <b>42561</b> | <b>24272</b> | <b>201392</b>      | <b>163091</b>      |

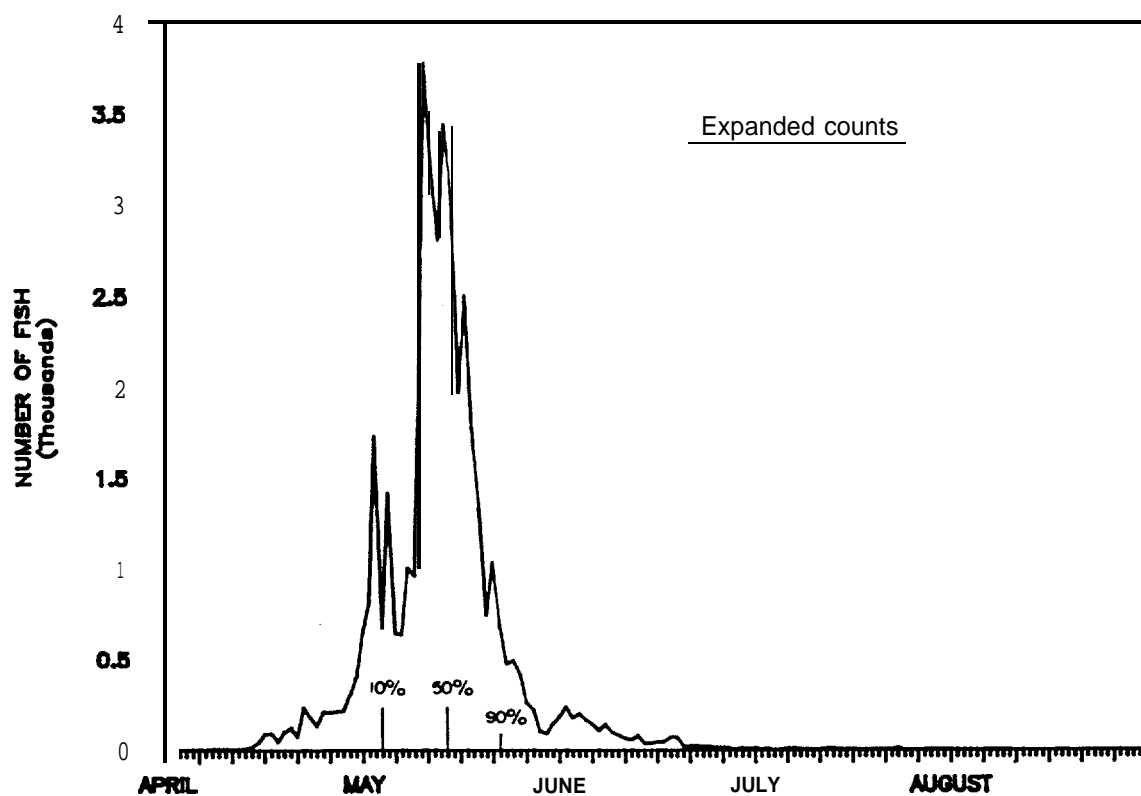
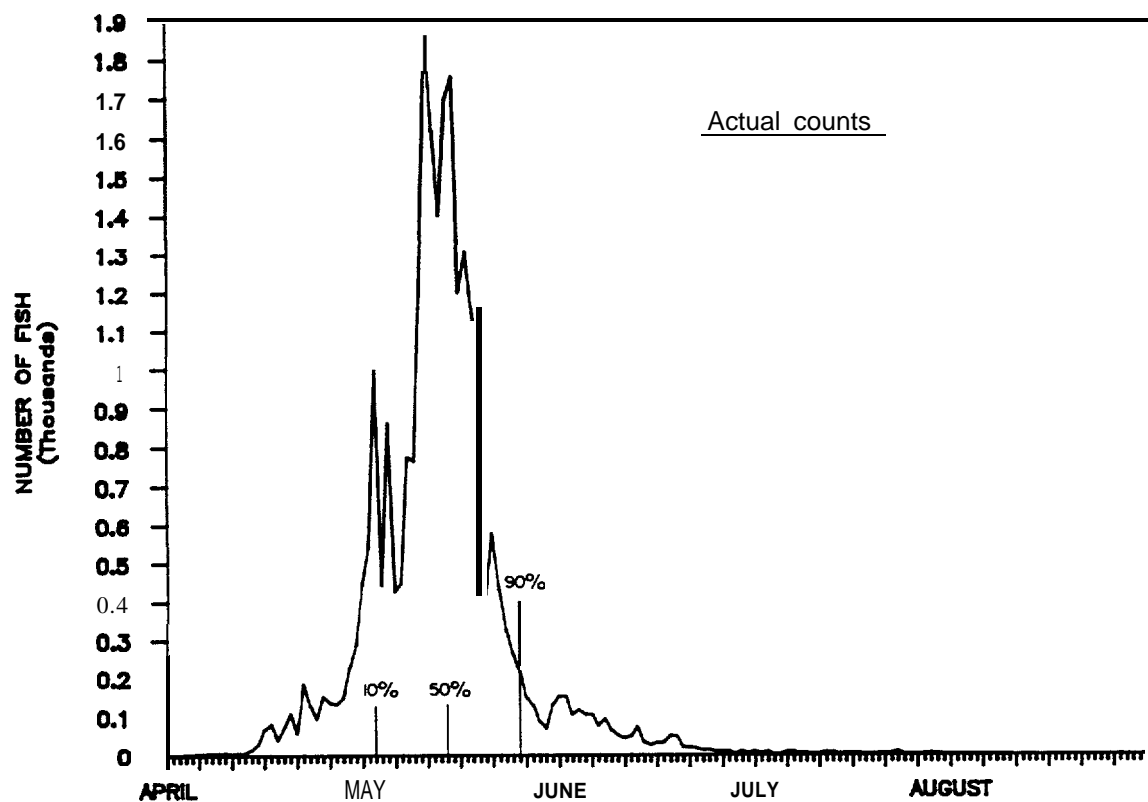




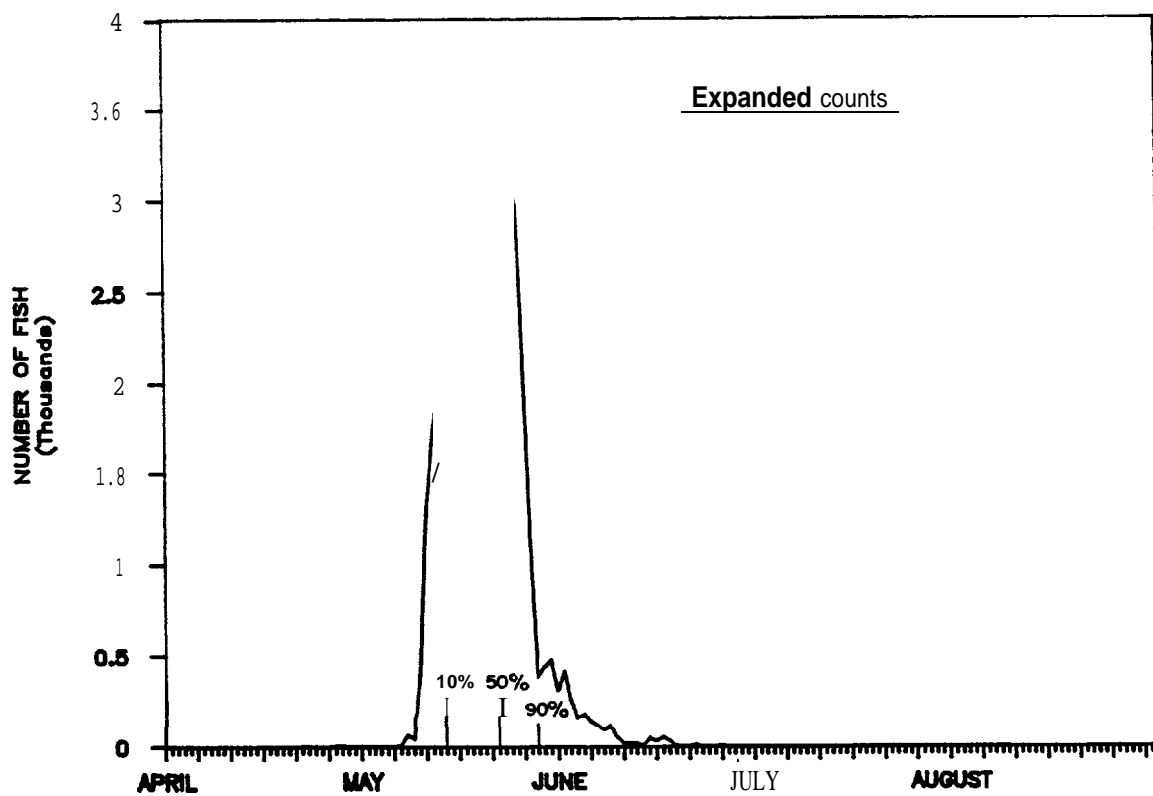
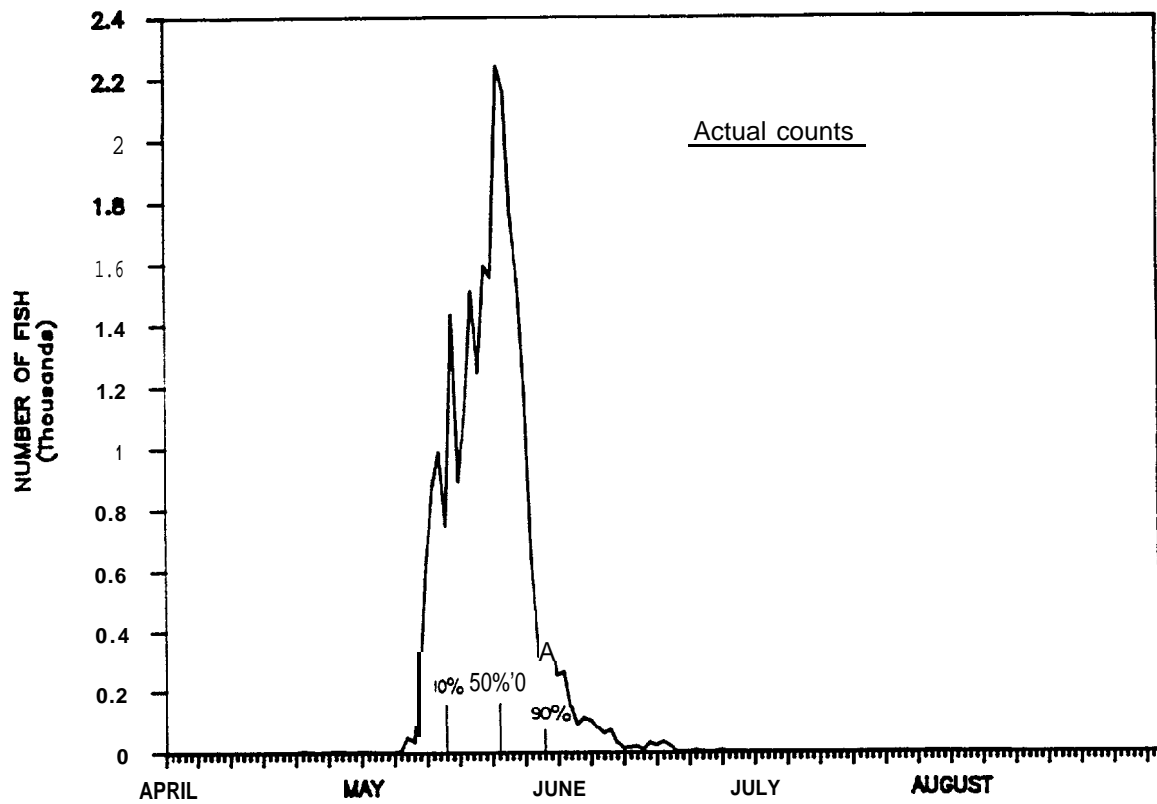
Appendix C-1 . Chinook yearling run timing, Rock Island Dam, 2 April - 31 August, 1988.



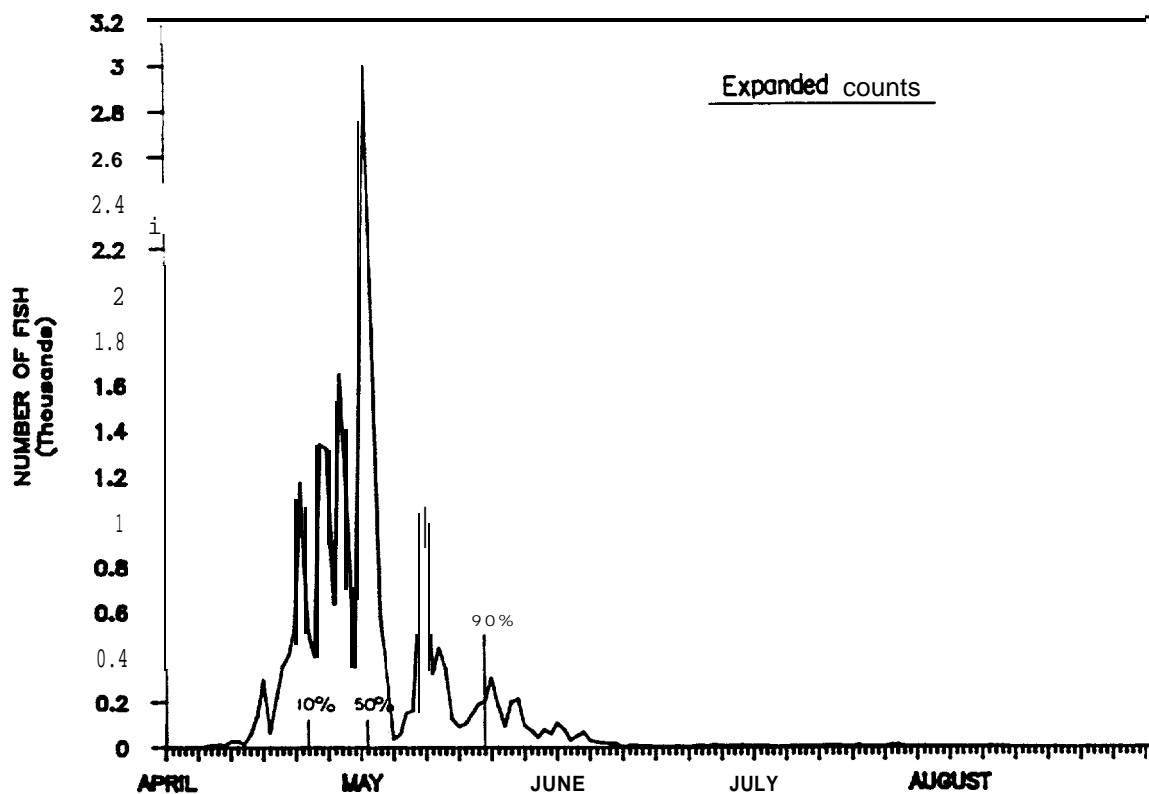
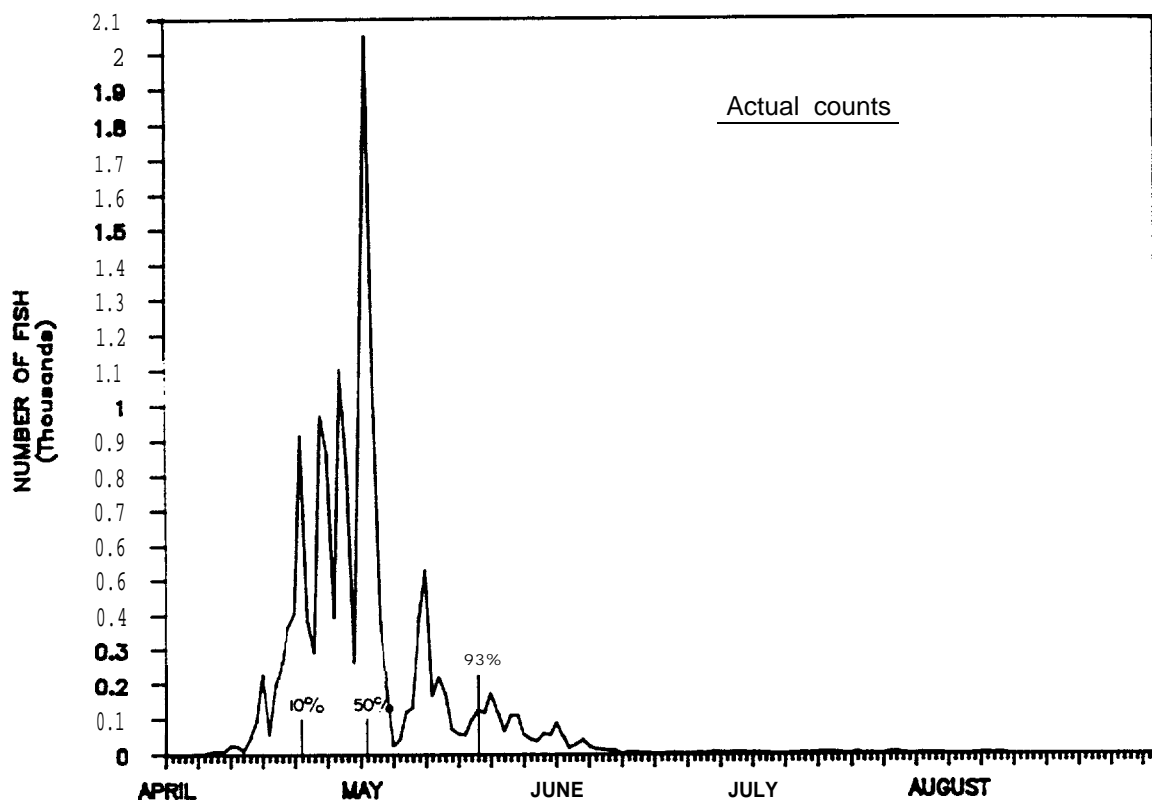
Appendix C-2. Chinook sub-yearling run timing, Rock Island Dam ,  
2 April - 31 August, 1988.



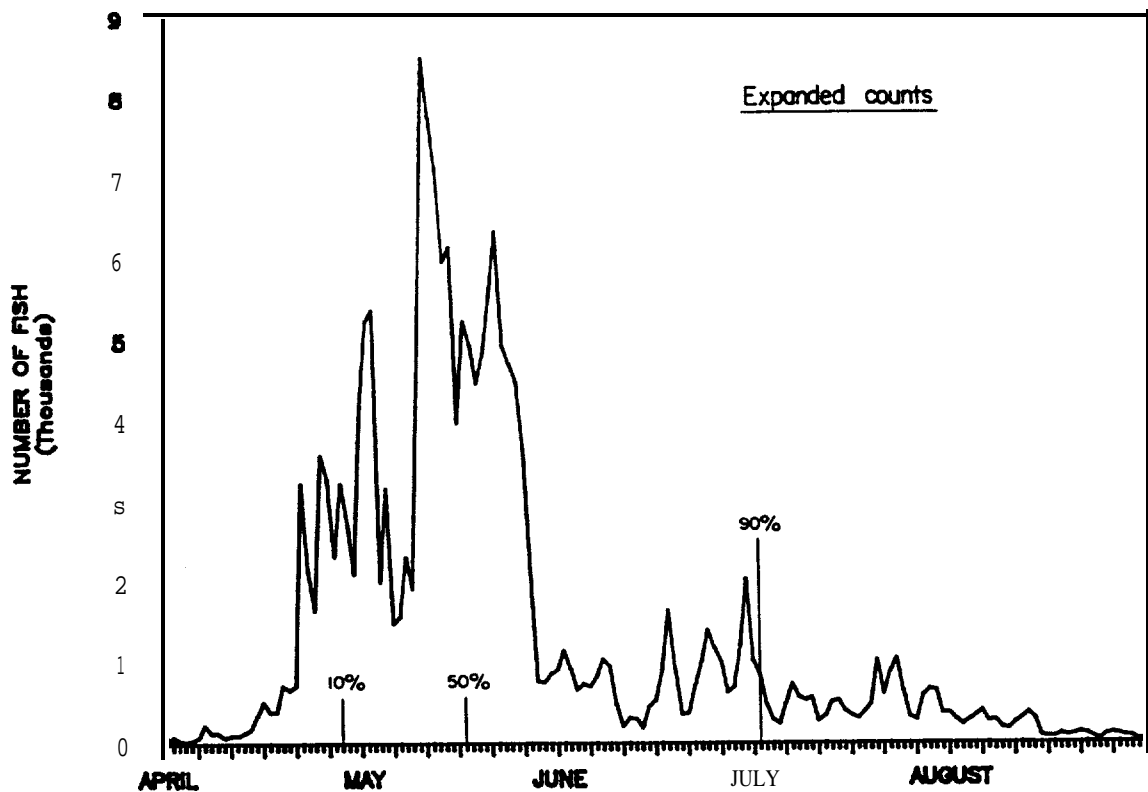
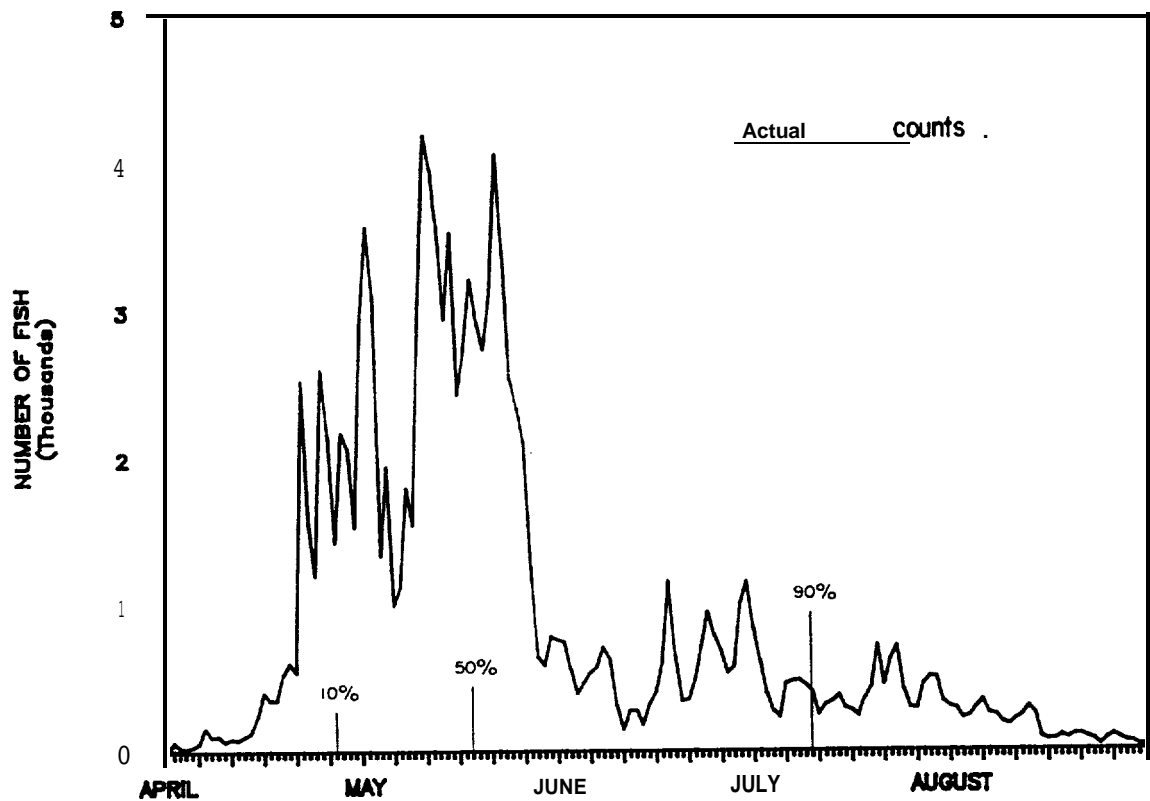
Appendix C-3. Steelhead smelt run timing, Rock Island Dam, 2 April - 31 August, 1988.



Appendix C-4. Coho smelt run timing, Rock Island Dam, 2 April - 31 August, 1988.



Appendix C-5. Sockeye smelt run timing, Rock Island Dam, 2 April - 31 August, 1988.



Appendix C-6. Total juvenile **salmonid** run timing, Rock Island Dam, 2 April - 31 August, 1988.



Chitnook Brands  
 Ad Clips  
 Steelhead Brands  
 Date LA/7C/1 LA/7C/3 RA/7C/1 RA/7C/3 RA/7H /1 RA/7T/1 LA/1 5/3 LA/1 5/1 RA/1 5/1 RA/1 5/3 RD/R/3  
 Subyr Yr/Ing 7U/LA/1RA/7U/3 A D C14 P s

|          |     |     |    |    |    |     |    |     |    |     |    |      |       |
|----------|-----|-----|----|----|----|-----|----|-----|----|-----|----|------|-------|
| 05/07/88 | 2   | 3   | 7  | 1  | 9  | 3   | 1  | 10  | 6  | 205 | 30 | ZS   | 344   |
| 05/02/88 | 4   | 1   | 3  | Z  | Z  | q   | q  | E   | 7  | 108 | 35 | Z9   | 474   |
| 05/01/88 | 6   | 1   | 3  | q  | 10 | q   | z  | 8   | 9  | 81  | 77 | 45   | 931   |
| 05/01/88 | 2   | 1   | 1  | 1  | E  | 1   | 1  | q   | 4  | Z6  | 41 | 24   | 387   |
| 05/05/88 | 2   | Z   | Z  | Z  | Z  | S   | S  | E   | 6  | 43  | Z9 | 32   | 771   |
| 05/06/88 | 2   | 1   | 1  | 1  | 4  | Z   | E  | 1   | Z  | 63  | 18 | 17   | 373   |
| 05/07/88 | 1   | 0   | 1  | 1  | E  | S   | 6  | E   | S  | 100 | Z0 | 15   | 372   |
| 05/08/88 | 1   | E   | Z  | 1  | 3  | q   | S  | 7   | q  | 112 | 30 | 18   | 701   |
| 05/09/88 | 4   | 4   | S  | 1  | 9  | 1   | 7  | S   | 6  | 72  | 17 | 16   | 719   |
| 05/10/88 | 7   | 4   | 4  | Z  | 14 | 10  | S  | 14  | 9  | 104 | 53 | 16   | 1192  |
| 05/11/88 | 5   | 4   | 3  | 8  | 9  | 10  | 16 | 159 | 21 | 159 | 53 | 14   | 1773  |
| 05/12/88 | 8   | 9   | 8  | 13 | 14 | 9   | 12 | 301 | 14 | 301 | S8 | 11   | 1530  |
| 05/14/88 | 7   | 1   | 1  | 1  | Z  | Z   | 1  | 73  | Z  | 131 | 37 | 7    | 1284  |
| 05/14/88 | 4   | 6   | 8  | 4  | 3  | E   | S  | 131 | q  | 131 | 37 | 7    | 1284  |
| 05/15/88 | 4   | 3   | 4  | 1  | 1  | Z   | 1  | 31  | Z  | 29  | 16 | S    | 1601  |
| 05/16/86 | 2   | Z   |    |    | E  | q   |    | Z0  |    | 16  | 16 | Z    | 1095  |
| 05/17/88 | 2   | S   |    |    |    |     |    | 60  | Z  | 33  | 33 | 4    | 1126  |
| 05/18/88 | 3   | S   |    |    |    | 1   | 1  | 384 | Z  | 25  | 25 | 6    | 934   |
| 05/20/88 | 7   | 1   | 6  | 4  | Z  |     |    | 106 | 2  | 129 | 12 | Z    | 776   |
| 05/21/88 | 8   | 30  | 9  | 4  |    | 1   |    | 89  | 1  | 123 |    | 1    | 467   |
| 05/22/88 | 8   | 13  | 10 | S  | 7  |     |    | 72  |    | 115 |    |      | Z06   |
| 05/23/88 | 13  | 10  | S  | 7  |    |     |    | 111 |    | 115 |    |      | Z06   |
| 05/24/88 | 2   | S   | Z  |    |    |     |    | 111 |    | 115 |    |      | Z06   |
| 05/26/88 | 3   | 7   | 1  | 6  | 6  | 1   |    | 126 |    | 126 |    |      | 105   |
| 05/27/88 | 9   | 6   | Z  | E  | 0  | 1   |    | 84  | 1  | 23  |    |      | 79    |
| 05/28/88 | 1   | Z   | 0  | 1  |    |     |    | 23  | Z  | 23  |    |      | 48    |
| 05/29/88 | 0   | 0   | 0  | 0  | 0  | 1   |    | 14  | 0  | 14  |    | 0    | 42    |
| 05/30/88 | 1   | 0   | 0  | 1  | 0  | 0   |    | 42  | 0  | 42  |    | 0    | 87    |
| 05/it/88 | Z   |     |    |    |    |     |    | 80  |    | 80  |    |      | 124   |
| Totals:  | 114 | 111 | 70 | 83 | 20 | 101 | 10 | 176 | 91 | 109 | 0  | 3187 | 20009 |



Ad Clips      Steel Head Brands

Date LA/7C/1 LA/7C/3 RA/7C/1 RA/7C/3 RA/7C/3 RA/7H/1 RA/7T/1 LA/1 S/3 LA/1 S/3 RD/R/3 Subyr Yr/ing 7U/LA/1 RA/7U/3 Ad Cl/ps

[illegible]

|    |    |
|----|----|
| 53 | 53 |
| 52 | 52 |
| 51 | 51 |
| 50 | 50 |
| 49 | 49 |
| 48 | 48 |
| 47 | 47 |
| 46 | 46 |
| 45 | 45 |
| 44 | 44 |
| 43 | 43 |
| 42 | 42 |
| 41 | 41 |
| 40 | 40 |
| 39 | 39 |
| 38 | 38 |
| 37 | 37 |
| 36 | 36 |
| 35 | 35 |
| 34 | 34 |
| 33 | 33 |
| 32 | 32 |
| 31 | 31 |
| 30 | 30 |
| 29 | 29 |
| 28 | 28 |
| 27 | 27 |
| 26 | 26 |
| 25 | 25 |
| 24 | 24 |
| 23 | 23 |
| 22 | 22 |
| 21 | 21 |
| 20 | 20 |
| 19 | 19 |
| 18 | 18 |
| 17 | 17 |
| 16 | 16 |
| 15 | 15 |
| 14 | 14 |
| 13 | 13 |
| 12 | 12 |
| 11 | 11 |
| 10 | 10 |
| 9  | 9  |
| 8  | 8  |
| 7  | 7  |
| 6  | 6  |
| 5  | 5  |
| 4  | 4  |
| 3  | 3  |
| 2  | 2  |
| 1  | 1  |

44

| Ad C1 ips      | Subyr Yr1 ng 7U/LA/1 RA/7U/3 Ad C1 ips                                     |
|----------------|--|
| Chinook Brands | RA/7C/1 RA/7C/3 RA/7H/1 RA/7T/1 LA/1 5/3 LA/1 5/1 RA/1 5/1 RA/1 5/3 RD/R/3 |
| Ad C1 ips      | Steelhead Brands   |

| Subj    | Yr      | ng      | 7U/LA/1 | RA/7U/3 | Ad  | Cl   | tps |      |     |      |     |        |
|---------|---------|---------|---------|---------|-----|------|-----|------|-----|------|-----|--------|
| RA/7C/1 | RA/7C/3 | RA/7H/1 | RA/7T/1 | LA/1    | 5/3 | LA/1 | 5/1 | RA/1 | 5/1 | RA/1 | 5/3 | RD/R/3 |

1  
1  
1  
1

z  
l

summary of branded chitnook and steel head sampled from the Rock Island Dam bypass trap, 2 April - 31 August, 1988.

Chitnook Brands Ad C1tps Steelhead Brands

RA/7C/1 RA/7C/3 RA/7H/1 RA/7T/1 LA/1 S/3 LA/1 S/1 RA/1 S/1 RA/1 S/3 RD/R/3 Subyr Yrlng 7U/LA/1 RA/7U/3 Ad C1 tps

|   |    |    |    |     |     |     |     |     |     |      |      |     |       |
|---|----|----|----|-----|-----|-----|-----|-----|-----|------|------|-----|-------|
| 7 | 20 | 11 | 54 | 113 | 42  | 43  | 34  | 46  | 0   | 1407 | 21   | 82  | 557   |
| 1 | 70 | 83 | 20 | 101 | 10  | 64  | 97  | 109 | 0   | 31   | 81   | 646 | 20009 |
| 0 | 4  | 1  | 1  | 0   | 0   | 0   | 0   | 0   | 101 | 461  | 1781 | 0   | 1 040 |
| 0 | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 28  | 134  | 1    | 0   | 83    |
| 0 | 0  | 0  | 0  | 0   | 0   | 0   | 0   | 0   | 0   | 3    | 0    | 0   | 4     |
| 3 | 94 | 95 | 75 | 214 | 112 | 107 | 131 | 155 | 129 | 598  | 6376 | 667 | 21693 |

Appendix E-1 . Daily summary of branded accelerated growth chinook sub-yearlings captured at the Rock Island Darn bypass trap, Apri 1, 1988.

| Date            | IA/IO/I | LA/10/3 | RA/10/1 | RA/10/3 | IA / IZ / I | LA/IZ/3 | RA/IZ/1 | RA/IZ/3 | LA/1 2/1 | LA/12/3 | RA/12/1 | RA/1 2/3 |
|-----------------|---------|---------|---------|---------|-------------|---------|---------|---------|----------|---------|---------|----------|
| 04/01/88        |         |         |         |         |             |         |         |         |          |         |         |          |
| 04/02/88        |         |         |         |         |             |         |         |         |          |         |         |          |
| 04/03/88        |         |         |         |         |             |         |         |         |          |         |         |          |
| 04/04/88        |         |         |         |         |             |         |         |         |          |         |         |          |
| 04/05/88        |         |         |         |         |             |         |         |         |          |         |         |          |
| 04/06/88        |         |         |         |         |             |         |         |         |          |         |         |          |
| 04/07/88        |         |         |         |         |             |         |         |         |          |         |         |          |
| 04/08/88        |         |         |         |         |             |         |         |         |          |         |         |          |
| 04/09/3a        |         |         |         |         |             |         |         |         |          |         |         |          |
| 04/1 0/88       | 1       |         |         |         |             |         |         |         |          |         |         |          |
| 04/1 1/88       |         |         |         | 1       |             |         |         |         |          |         |         |          |
| <b>04/12/88</b> | 1       | 2       | 3       |         |             |         |         |         |          |         |         |          |
| 04/13/88        | 7       | 7       | 6       | 8       |             |         |         |         |          |         |         |          |
| <b>04/14/88</b> | 10      | 7       | 3       | 8       |             |         |         |         |          |         |         |          |
| <b>04/15/88</b> | 5       | 4       | 2       | 8       |             |         |         |         |          |         |         |          |
| <b>04/16/88</b> |         | 6       | 4       | 2       |             |         |         |         |          |         |         |          |
| 04/17/88        | 6       | 4       | 4       | 0       |             |         |         |         |          |         |         |          |
| <b>04/18/88</b> |         |         | 1       | 3       |             |         |         |         |          |         |         |          |
| 04/1 9/88       |         | 1       |         | 3       |             |         |         |         |          |         |         |          |
| 04/20/88        |         |         |         |         |             |         |         |         |          |         |         |          |
| <b>04/21/88</b> |         |         |         | 1       |             |         |         |         |          |         |         |          |
| 04/22/88        |         |         |         | 1       |             |         |         |         |          |         |         |          |
| <b>04/23/88</b> |         |         |         |         |             |         |         |         |          |         |         |          |
| <b>04/24/88</b> | 25      | 15      | 22      | 22      |             |         |         |         | 6        | 7       | 2       | 11       |
| <b>04/25/88</b> | 27      | 32      | 46      | 42      |             |         |         |         | 14       | 15      | 26      | 23       |
| <b>04/26/88</b> | 10      | 6       | 22      | 16      |             |         |         |         | 13       | 7       | 13      | 26       |
| <b>04/27/88</b> | 8       | 6       | 11      | 10      |             |         |         |         | 13       | 6       | 8       | 12       |
| <b>04/28/88</b> | 4       | 6       | 7       | 5       |             |         |         |         | 6        | 5       | 9       | 7        |
| <b>04/29/88</b> | 3       | 1       | 2       | 3       |             |         |         |         | 1        | 5       | 4       | 3        |
| 04/30/88        | 2       | 4       | 3       | 5       |             |         |         |         | 2        | 2       | 2       | 6        |
| Totals:         | 109     | 101     | 136     | 138     | 0           | 0       | 0       | 0       | 55       | 47      | 64      | 88       |

Appendix E-2. Daily summary of branded accelerated growth chinook sub-yearlings captured at the Rock Island Dam bypass trap, May, 1 988.

| Date      | IA/IO/I | LA/10/3 | I?A/IO/I | RA/10/3 | LA/IZ/1 | LA/IZ/3 | RA/IZ/1 | RA/IZ/3 | LA/1 | Z/1 | LA/12/3 | RA/12/1 | RA/12/3 |
|-----------|---------|---------|----------|---------|---------|---------|---------|---------|------|-----|---------|---------|---------|
| 05/01 /88 | 1       | 3       | 1        | 2       |         |         |         |         | 5    | 4   | 7       | 9       |         |
| 05/02/88  | 3       | 3       | 3        | 6       |         |         |         |         | 5    | 5   | 4       | 3       |         |
| 05/03/88  | 4       | 4       | 7        | 4       |         |         |         |         | 5    | 3   | 2       | 7       |         |
| 05/04/88  | 1       | 1       | 1        |         |         |         |         |         | 1    | 1   |         | 1       |         |
| 05/05/88  |         | 3       |          | 2       |         |         |         |         |      | 1   |         | 3       |         |
| 05/06/88  |         | 1       | 1        | 2       |         |         |         |         | 2    | 2   | 2       | 2       |         |
| 05/07/88  | 0       | 1       | 2        | 0       |         |         |         |         | 5    | 1   | 1       | 2       |         |
| 05/08/88  | 1       | 0       | 1        | 0       |         |         |         |         | 2    | 0   | 2       | 1       |         |
| 05/09/88  |         |         | 2        |         |         |         |         |         | 3    | 1   |         | 2       |         |
| 05/10/88  | 4       | 3       |          | 6       |         |         |         |         | 6    | 4   | 11      | 6       |         |
| 05/11/88  | 6       | 4       | 7        | 10      |         |         |         |         | 16   | 15  | 12      | 17      |         |
| 05/12/88  | 10      | 9       | 13       | 7       |         |         |         |         | 30   | 18  | 23      | 30      |         |
| 05/13/88  | 9       | 8       | 5        | 9       |         |         |         |         | 23   | 18  | 15      | 14      |         |
| 05/14/88  | 2       | 2       | 4        | 3       |         |         |         |         | 12   | 14  | 12      | 8       |         |
| 05/15/88  | 2       | 3       | 1        |         |         |         |         |         | 4    | 4   | 4       | 3       |         |
| 05/16/88  | 2       | 2       | 1        | 1       |         |         |         |         | 2    | 1   | 3       | 3       |         |
| 05/17/88  | 1       | 2       | 2        | 3       | 1       |         |         |         | 3    | 1   | 2       | 4       |         |
| 05/18/88  | 7       | 2       | 2        |         | 14      | 8       | 18      | 22      | 9    | 4   | 3       | 2       |         |
| 05/19/88  | 8       | 5       | 4        | 7       | 17      | 30      | 25      | 22      | 2    | 2   | 2       | 1       |         |
| 05/20/88  | 6       | 11      | 3        | 5       | 8       | 16      | 12      | 20      | 5    | 4   | 4       | 5       |         |
| 05/21/88  | 4       | 2       | 8        | 4       | 9       | 15      | 10      | 9       | 8    | 1   | 9       | 6       |         |
| 05/22/88  | 9       | 3       | 3        | 3       | 5       | 3       | 7       | 5       | 6    | 6   | 12      | 7       |         |
| 05/23/88  | 3       | 4       | 2        | 1       | 8       | 6       | 3       | 7       | 10   | 5   | 9       | 7       |         |
| 05/24/88  | 9       | 8       | 6        | 3       | 1       | 7       | 5       | 12      | 10   | 10  | 5       | 10      |         |
| 05/25/88  | 10      | 4       | 15       | 7       | 6       | 5       | 11      | 12      | 7    | 10  | 9       | 10      |         |
| 05/26/88  | 10      | 6       | 9        | 9       | 4       | 7       | 7       | 3       | 13   | 13  | 22      | 21      |         |
| 05/27/88  | 5       | 1       | 6        | 9       | 7       | 7       | 4       | 3       | 7    | 9   | 11      | 12      |         |
| 05/28/88  | 1       | 1       | 1        | 2       | 2       |         | 1       | 1       | 3    | 4   | 1       | 4       |         |
| 05/29/88  | 1       | 3       | 0        | 2       | 1       | 3       | 0       | 1       | 1    | 0   | 1       | 0       |         |
| 05/30/88  | 0       | 0       | 3        | 4       | 2       | 2       | 4       | 8       | 4    | 5   | 2       | 7       |         |
| 05/31/88  | 7       | 1       | 3        | 4       | 3       | 10      | 10      | 8       | 12   | 4   | 10      | 8       |         |
| Totals:   | 126     | 100     | 116      | 115     | 88      | 119     | 117     | 133     | 221  | 170 | 200     | 215     |         |

Appendix E-3. Daily summary of branded accelerated growth chinook sub-yearlings captured at the Reck Island Dam bypass trap, June, 1988.

| Date      | L A / I O / I | L A / I O / 3 | RA/1 O/1 | RA/10/3 | LA/IZ/1 | LA/IZ/3 | RA/IZ/1 | RA/IZ/3 | LA/12/1 | LA/12/3 | RA/12/1 | RA/12/3 |
|-----------|---------------|---------------|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 06/01 /88 | 8             | 2             | 4        | 7       | 5       | 5       | 11      | 10      | 8       | 5       | 3       | 19      |
| 06/02/88  | 1             | 3             | 2        | 1       |         | 7       | 4       | 4       | 3       | 5       | 4       | 5       |
| 06/03/88  | 5             | 1             | 7        | 1       | 4       | 6       | 4       | 2       | 6       | 1       | 3       | 1       |
| 06/04/88  | 4             | 3             | 1        | 3       | 1       | 3       | 1       | 10      |         | 2       | 3       | 3       |
| 06/05/88  | 3             | 3             | 3        | 3       | 20      | 13      | 14      | 19      | 1       | 6       |         | 2       |
| 06/06/88  | 10            | 2             | 6        | 7       | 24      | 22      | 32      | 25      | 10      | 13      | 19      | 10      |
| 06/07/88  | 9             | 4             | 6        | 4       | 35      | 30      | 38      | 30      | 17      | 10      | 7       | 11      |
| 06/08/88  | 2             | 1             |          | 3       | 12      | 26      | 20      | 21      | 9       | 5       | 15      | 15      |
| 06/09/88  | 1             | 1             | 1        | 2       | 7       | 13      | 8       | 4       | 5       | 5       | 3       | 2       |
| 06/10/88  |               |               |          |         | 1       | 2       |         | 2       |         | 2       |         | 1       |
| 06/11/88  |               | 1             | 2        |         | 3       | 9       | 5       | 6       | 4       | 2       | 1       |         |
| 06/1 2/88 |               |               | 1        |         | 4       | 10      | 14      | 7       | 1       |         | 2       |         |
| 06/1 3/88 |               |               |          |         | 6       | 10      | 2       | 7       | 2       | 2       | 2       | 1       |
| 06/14/88  | 1             |               |          | 4       | 20      | 9       | 17      | 22      | 1       | 1       | 4       | 3       |
| 06/1 5/88 | 2             | 2             | 8        | 4       | 46      | 30      | 47      | 36      | 2       | 5       | 3       | 3       |
| 06/16/8a  | 6             | 4             |          | 3       | 49      | 38      | 56      | 67      | 8       | 7       | 4       | 7       |
| 06/17/88  | 3             | 2             | 3        | 3       | 35      | 32      | 48      | 44      | 4       | 3       | 4       | 5       |
| 06/18/88  |               | 1             |          |         | 7       | 10      | 4       | 7       |         |         |         |         |
| 06/19/88  |               |               |          |         |         |         |         |         |         |         |         |         |
| 06/20/88  |               |               |          | 1       | 3       |         | 3       | 1       |         |         |         |         |
| 06/21 /88 |               |               |          |         | 6       | 3       | 4       | 2       |         |         |         |         |
| 06/22/88  | 2             |               |          |         | 5       | 5       | 6       | 5       |         |         |         |         |
| 06/23/88  |               |               |          |         | 3       | 2       |         | 3       |         |         |         |         |
| 06/24/88  |               |               |          |         | 1       | 3       | 2       | 2       |         |         |         |         |
| 06/25/88  |               |               |          |         | 1       |         |         | 1       |         |         |         |         |
| 06/26/88  |               |               |          |         | 1       | 1       |         | 1       |         |         |         |         |
| 06/27/88  |               |               |          |         | 3       |         |         |         |         |         |         |         |
| 06/28/88  |               |               |          |         |         | 1       | 1       |         |         |         |         |         |
| 06/29/88  |               |               |          |         |         |         |         |         |         |         |         |         |
| 06/30/88  |               |               |          |         |         |         |         |         |         |         |         |         |
| Totals:   | 57            | 30            | 45       | 46      | 308     | 290     | 341     | 338     | 81      | 74      | 77      | 88      |

Appendix E-4. Daily summary of branded accelerated growth chinook sub-yearlings captured at the Rock Island Dam  
bypass trap, July, 1988.

=====

Date LA/IO/I LA/10/3 RA/10/1 RA/10/3 LA/IZ/1 LA/IZ/3 RA/IZ/1 RA/IZ/3 LA/12/1 LA/12/3 RA/12/1 RA/12/3

07/01 /88  
07/02/88  
07/03/w  
07/04/88  
07/05/88  
07/06/80  
07/07/83  
07/00/03  
07/09/08  
07/10/88  
07/11/88  
07/12/88  
07/13/80  
07/14/88  
07/15/88  
07/16/08  
07/17/80  
07/18/09  
07/19/88  
07/20/83  
07/21/88  
07/22/00  
07/23/08  
07/24/08  
07/25/88  
07/26/80  
07/27/88  
07/28/88  
07/29/00  
07/30/88  
07/31 /88

Totals: 0 0 0 0 0 0 0 0 0 0 0 0

=====



Appendix E-5. Daily summary of branded accelerated growth chinook sub-yearlings captured at the Rock Island Dam  
bypass trap, August, 1988.

| Date     | LA/10/1 | LA/10/3 | RA/10/1 | RA/10/3 | LA/IZ/1 | LA/IZ/3 | RA/IZ/1 | RA/IZ/3 | LA/12/1 | LA/12/3 | RA/12/1 | RA/12/3 |
|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 08/01/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/02/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/03/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/04/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/05/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/06/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/07/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/08/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/09/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/10/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/11/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/12/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/13/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/14/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/15/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/16/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/17/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/18/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/19/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/20/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/21/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/22/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/23/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/24/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/25/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/26/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/27/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/28/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/29/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/30/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/31/88 |         |         |         |         |         |         |         |         |         |         |         |         |
| Totals:  | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |

Appendix E-6. Monthly summary of branded accelerated growth chinook sub-yearlings captured at the Rock Island Dam bypass trap, 2 April -31 August, 1988.

| Month   | LA/10/1 | LA/10/3 | LA/10/1 | RA/10/3 | LA/12/1 | LA/12/3 | RA/12/1 | RA/12/3 | LA/12/1 | LA/12/3 | RA/12/1 | RA/12/3 |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| April   | 109     | 101     | 136     | 13a     | 0       | 0       | 0       | 0       | 55      | 47      | 64      | 88      |
| May     | 126     | 100     | 116     | 115     | 88      | 119     | 117     | 133     | 221     | 170     | 200     | 215     |
| June    | 57      | 30      | 45      | 46      | 308     | 290     | 341     | 33a     | 81      | 74      | 77      | 88      |
| July    | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
| August  | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |
| Totals: | 292     | 231     | 297     | 299     | 3 %     | 409     | 453     | 471     | 357     | 291     | 341     | 391     |

ROCK ISLAND DAM SMOLT MONITORING, 1989

FINAL REPORT

by

Charles M. Peven

~~Paul C. Fielder~~

Fish and Wildlife Operations  
Power Operations Department  
Public Utility District No. 1 of **Chelan** County

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September, 1989

## ABSTRACT

Downstream migrating salmon (*Oncorhynchus spp.* ) and steelhead trout (*O. mykiss*) smelts were monitored at the Rock Island Dam bypass trap from 1 April -31 August, 1989. Data collected included: 1) number of fish caught by species, 2) number of branded fish caught by species, 3) daily average riverflow, 4) daily average powerhouse #1 and #2 flows and daily average spill. These data were transmitted to, and used by the Fish Passage Center to manage a "water budget" of allocated upstream water storage to augment river flows to improve survival of downstream migrating salmonids. The Rock island Dam trapping facility collected 116,092 downstream migrating salmonids in 1989. Collected fish included 5,443 chinook salmon (*O. tshawytscha*) and 538 steelhead which had been freeze branded (to determine migration rates) and 5,913 chinook and 20,485 steelhead with clipped adipose fins. The middle 80% of the 1989 spring migration (excluding sub-yearling chinooks) passed Rock island Dam during a 43 day period, 17 April - 30 May. Passage rates of hatchery released chinook and steelhead smelts and the downstream migration timing of all salmonids are presented. The spring migration timing of juvenile salmonids is strongly influenced by hatchery releases above Rock Island Dam.

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## INTRODUCTION

In 1982, the Northwest Power Planning Council developed a fish and wildlife program to protect, mitigate and enhance fish and wildlife resources affected by construction and operation of Columbia River hydroelectric facilities. Under this program, a “water budget” of allocated upstream water storage was established for instream flow augmentation to improve **survival** of downstream migrating salmon (*Oncorhynchus spp.* ) and steelhead trout (*O. mykiss*). The Council’s plan also called for studies to monitor juvenile fish migration timing and **survival**. The fishery agencies and tribes formed a Water Budget Center (renamed as the Fish Passage Center) to direct the use of the water budget and to conduct and coordinate studies related to water budget management and evaluation. The Fish Passage Center (**FPC**) developed a Smelt Monitoring Program and selected several sites on the Columbia and Snake rivers as smelt monitoring stations. Rock Island Dam was selected as one of these stations. It is the first dam located downstream from all of the major salmon and steelhead producing tributaries of the mid-Columbia River (Figure 1).

The Smelt Monitoring Program for the mid-Columbia River was designed to index the daily number of **outmigrating salmonids** and to report numbers of marked juveniles collected. Data collected under this program allow comparison and evaluation of year to year migration timing and travel time of different stocks of naturally and hatchery produced juvenile **salmonids**.

Funding of the program, as implemented by the Fish Passage Center, was provided by the Bonneville Power Administration. The Public Utility District No. 1 of Chelan County (the District) provided the trapping facility, personnel, and equipment to conduct the monitoring.

## METHODS

Daily sampling data collected at the Rock Island Dam monitoring station included 1) total number of fish caught by species, 2) total number of branded fish caught by species, 3) daily average riverflow, 4) daily average flow through Rock Island powerhouse #1 (old powerhouse) and Rock Island #2 (new powerhouse) (Figure 2), and daily average spill. The flow data were recorded so that an expanded index of fish passage through powerhouse #2 could be developed based on the bypass collection count in relation to the proportion of total **riverflow** passing through powerhouse #2.

To provide travel time estimates between hatchery release points and downstream sampling stations, including Rock Island Dam, yearling and sub-yearling chinook and steelhead from state and federal hatcheries were freeze branded (using liquid nitrogen) before release. All hatchery produced steelhead released in Washington state waters have been adipose fin clipped since 1985. A comparison between the release date of marked smelts and daily recoveries of these branded smelts at the bypass trap provided travel time estimates between the release points and the dam. Unmarked hatchery and naturally produced **salmonids** were also sampled to determine the timing of their migration past Rock Island Dam.



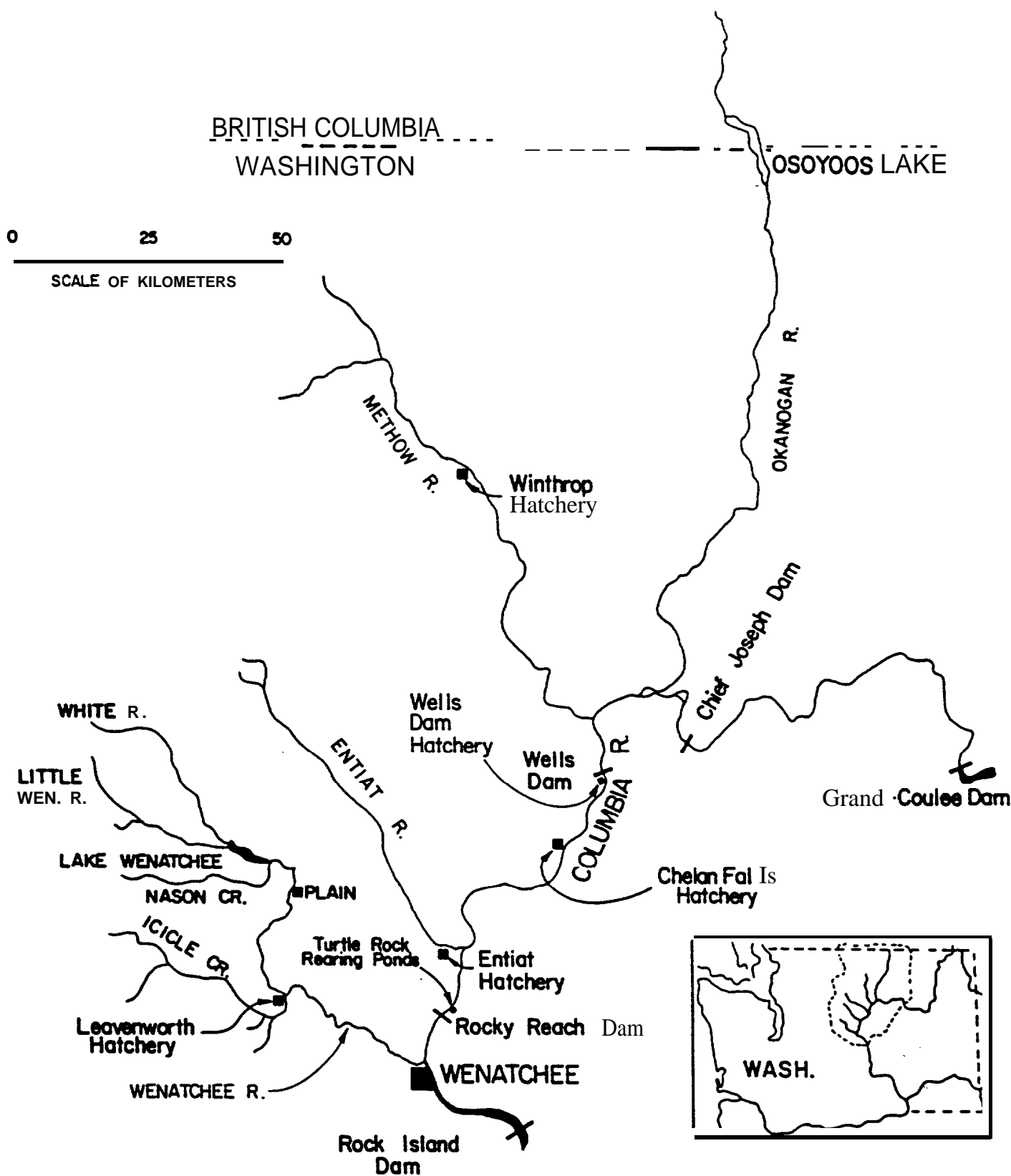
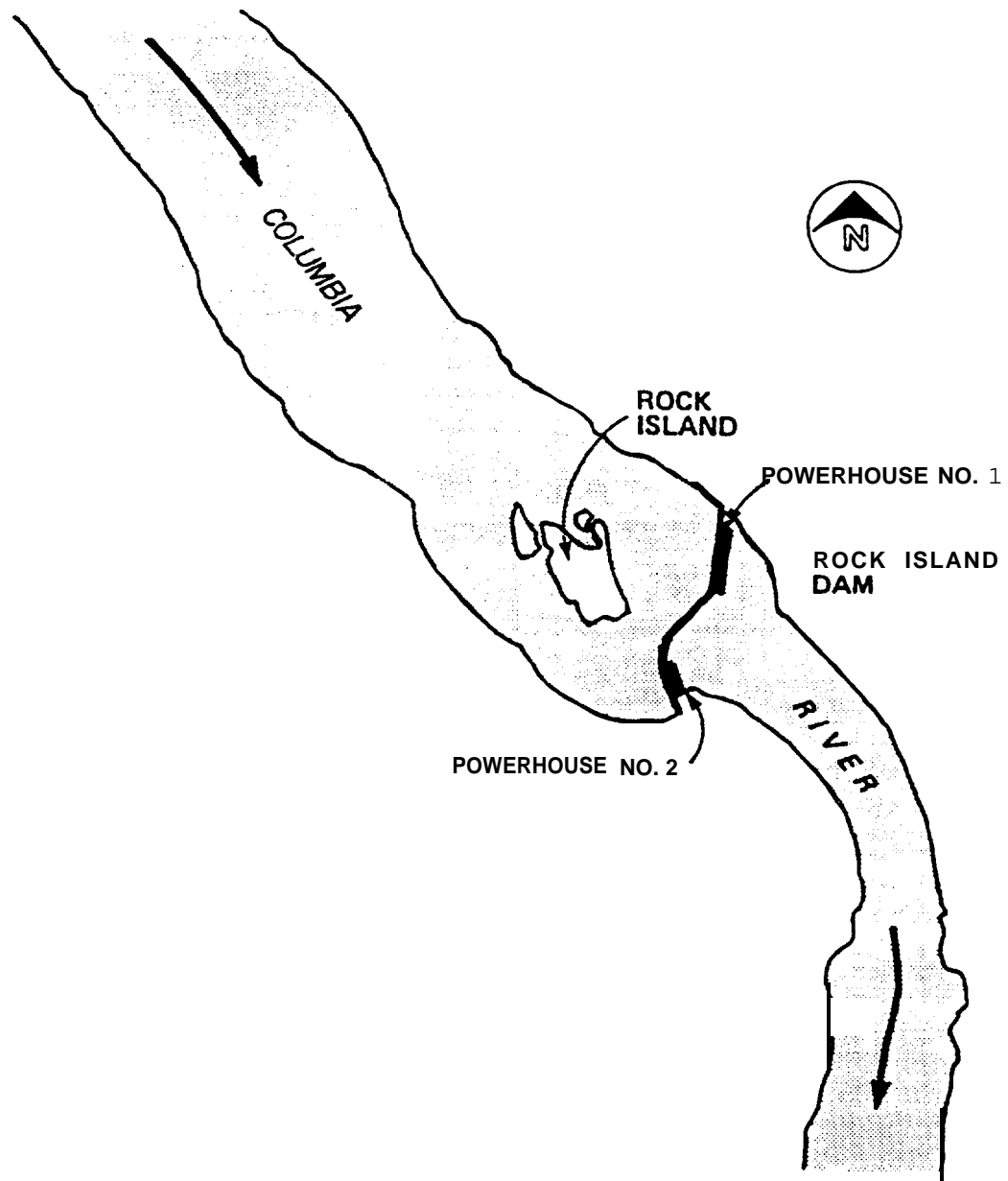


Figure 1. Columbia River between Rock Island and Grand Coulee dams showing major tributaries and hatcheries.



**Figure 2.** Location of powerhouse No. 1 and powerhouse No. 2 at Rock Island hydroelectric project (from Olson 1983).

Fish collected by the trap during the 24 hour sampling period (0900-0900) were held in the bypass flume before being delivered, via an elevator hopper, to an 8' x 8' x 3' portable fiberglass holding tank (Figures 3, 4, 5). The holding tank was supplied with a continuous water flow from the right bank fishladder with a 5 horsepower submersible pump.

Groups of 30-50 fish were anesthetized with a solution of **Tricaine** methane sulfonate (MS 222) before handling. Fish were identified by species and examined for brands and clipped fins in a sampling shed adjacent to the holding tank (Figure 5). Fork length (F. L.) measurements were taken three times per week from **subsamples** of sockeye (*O. nerka*), and after 30 May, from sub-yearling chinook. Steelhead were categorized as "hatchery" or "naturally-produced" according to clipped adipose fin, or if an adipose fin was present, a worn appearance of the dorsal and ventral fins (**Peven** and Hays 1989). The fish were then allowed to recover in an isolated section of the release tank.

After the examined fish had fully recovered from the effects of the anesthesia, they were released through a 4" PVC pipe from the recovery section of the tank (elevation 620' m.s.l.) to the **tailrace** (elevation 574' m.s.l.) (Figure 5). The release area of the **tailrace** was protected from gull predation with parallel lengths of 80 pound test monofilament fish line tied at approximately 6 foot intervals overhead of the pipe outlet. In addition, an employee of the U. S. Department of Agriculture's Animal Damage Control Division suppressed gull foraging in the **tailrace** during the middle 80% of the spring migration by various behavior modifying techniques.

Data pertinent to the smelt monitoring program were transferred from **Chelan P.U.D.** headquarters in **Wenatchee**, WA to the **FPC** (Portland, OR) daily via an IBM personal computer with resident software on the **FPC's** IBM System 36.

In addition to the smelt monitoring program, **subsamples** of chinook yearlings and steelhead were injected with Passive Integrated Transponder (PIT) tags each day between 21 April and 24 May. Equipment and procedures used in the PIT tagging operation were similar to the methods described by Prentice et al. (1987). A random **subsample** of chinook and **steelhead** were processed until 100 of each species were tagged. Data were entered into a portable computer and sent to the FPC and the National Marine Fisheries Service (NMFS) in Seattle. The fish that were PIT tagged at Rock Island Dam were "recaptured" at the McNary Dam bypass trap, where travel time estimates were recorded. Results of the monitoring program can be obtained from the FPC and will not be reported here.

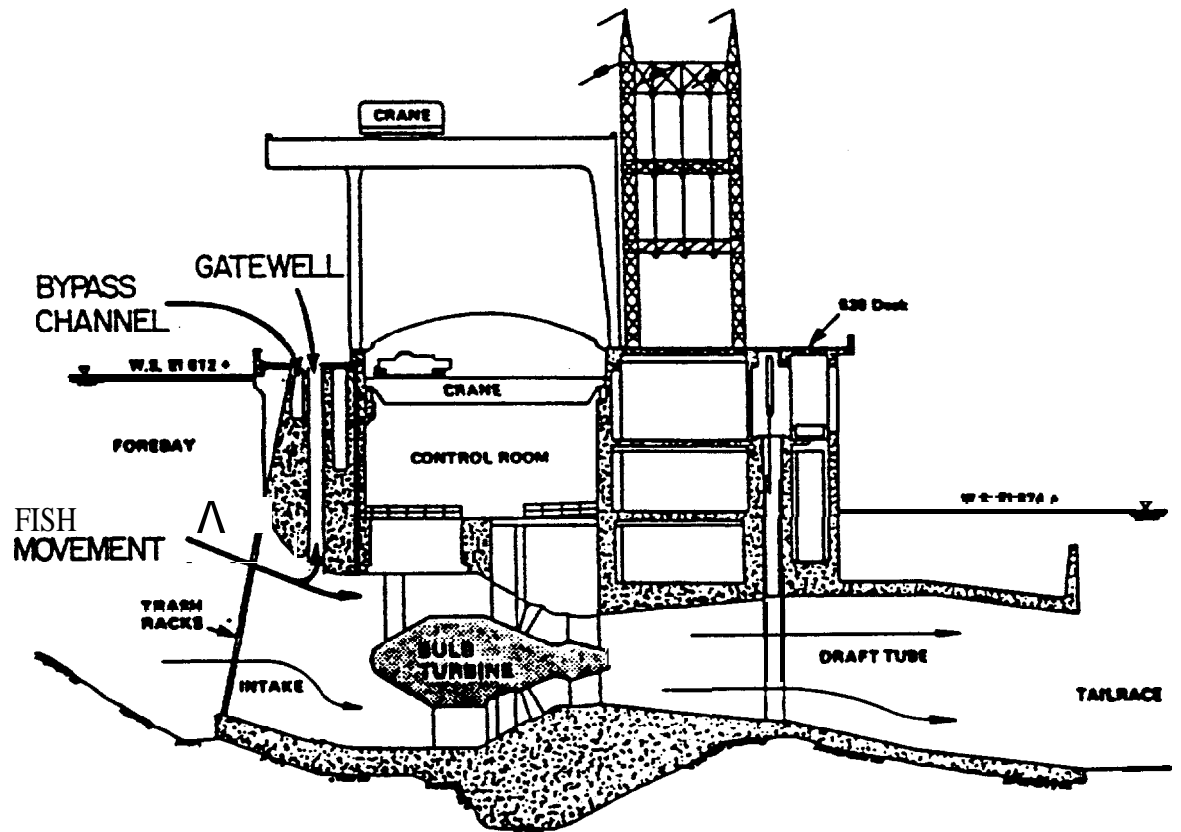


Figure 3. Section through Rock Island Dam second powerhouse indicating fish movement into the gatewell system (from Olson 1983).

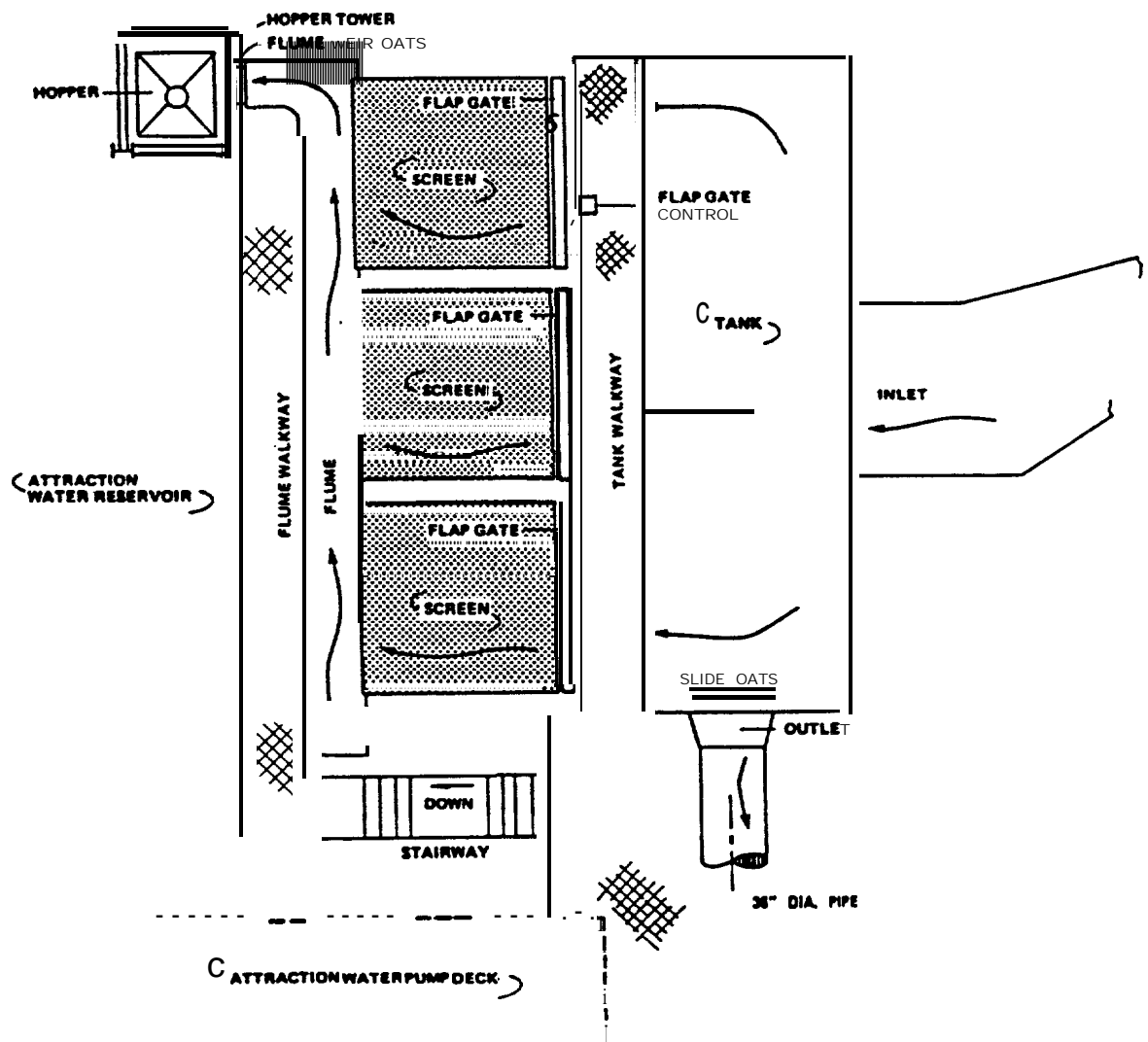


Figure 4. Rock Island Dam juvenile **salmonid** collection trap  
(from Olson 1983) .

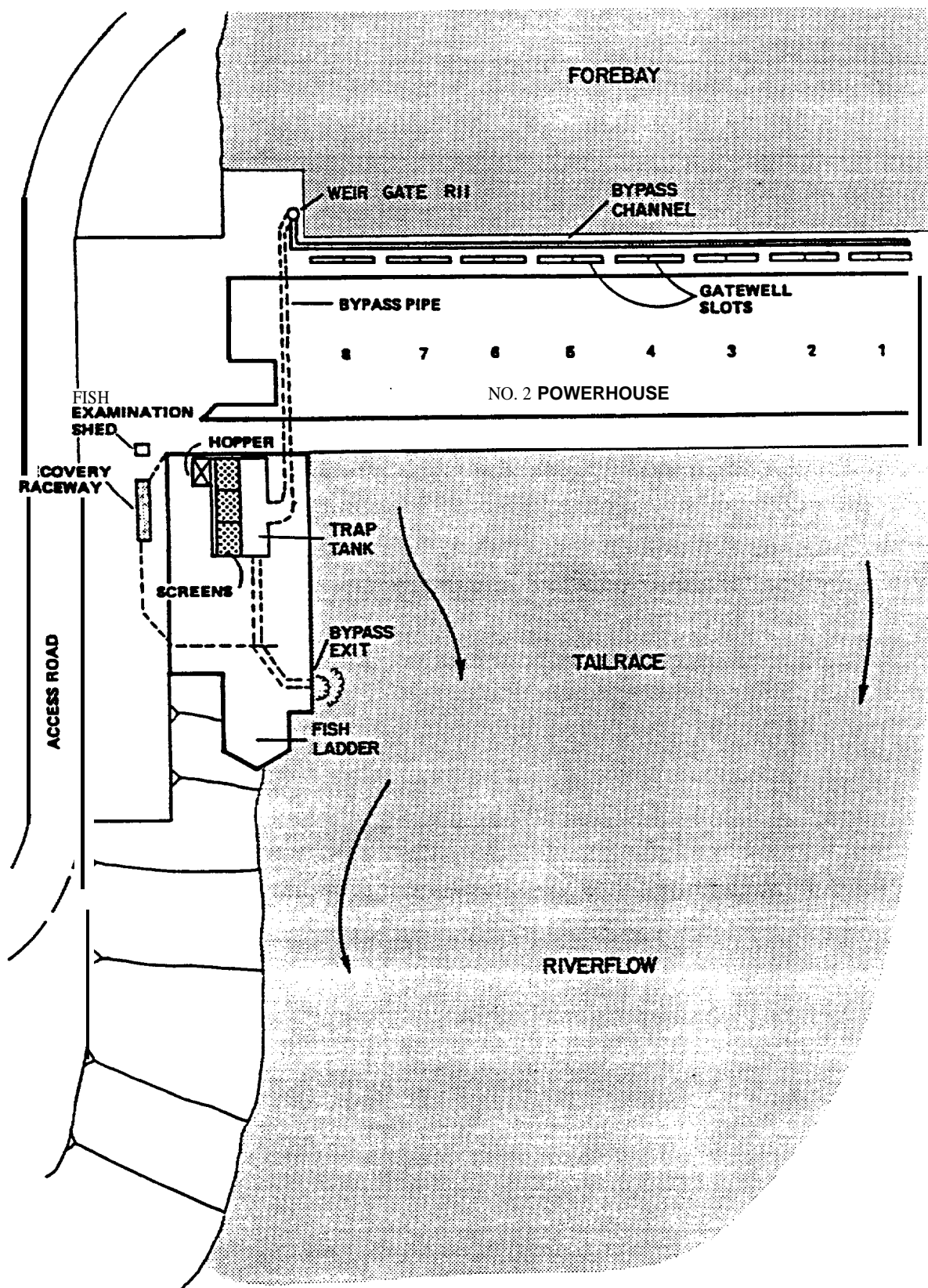


Figure 5. Plan view of juvenile **salmonid** bypass and collection system at Rock **Island Dam** second powerhouse (from Olson 1983).

## RESULTS AND DISCUSSION

The Rock Island Dam trapping facility collected 116,092 juvenile salmon and **steelhead** during the 1989 smelt monitoring program (Appendix A-1 - A-6). A total of 5,443 freeze branded chinook salmon and 538 freeze branded steelhead trout representing 32 distinct marks and releases, were collected and recorded during 1989 (Table 1, Apps. D-1 - D-6, E-1 - E-6). In **addition**, we collected 5,913 chinook and 20,485 steelhead with clipped adipose fins (Appendix D-1 - D-6).

The bypass trapping facility operated without mechanical failure during the smelt monitoring program. An examination of daily powerhouse #2 turbine flows in proportion to total river flow showed a variance in powerhouse operations during the period of peak **salmonid outmigration**. Monthly average percent of total flow through powerhouse #2 for the period of 1 April through 30 June ranged from 63.9 to 83.7% and daily averages ranged from 54.4 to 98.2970 (Table 2).

Average daily hydraulic data for Rock Island Dam were supplied to the FPC, which used it to develop an expansion of Rock Island trap data (Appendix B-1 - B-6). The expansion was derived by multiplying the actual trap collection count by the inverse proportion of water passing through powerhouse #2 during the sampling period (i.e., (collection count x 100) / (powerhouse #2 flow / powerhouse #1 flow + powerhouse #2 flow + spill)). A comparison of actual trap collection counts, the expanded **index**, and the five year average (using actual counts - Table 3) indicated some differences in the smelt run timing.

The largest difference in the run timing was a 20-24 day difference in the 10% passage date for chinook sub-yearlings between the actual counts and expanded index for 1989, and the 5 year average (Table 3, App. C-2). This difference is because the accelerated chinook sub-yearlings released from Leavenworth National Fish Hatchery were counted as sub-yearlings in 1989, while in 1988, they were included in the yearling counts (see below). Another notable difference observed in run timing was for sockeye. The difference between the actual counts and the 5 year average for the 50 and 90% passage dates was 10 and 19 days, respectively (Table 3, App. C-5). We attribute this difference in run timing to the low number of the Lake Osoyoos stock captured in 1989 (see discussion below). Other run timing differences were generally within 3 to 4 days (Table 3). We used actual count data in our analysis and discussion.

### 1. MIGRATION TIMING

#### **Yearling chinook**

A total of 10,252 chinook yearlings were captured at the bypass trap in 1989 (App. A-6). Yearling chinook were present the first day of the smelt monitoring **program**, 1 April, and except for 6 April (**App. A-1**) continued to be present every day until 15 June (**App. A-3**). The last yearling chinook was collected on 23 July, with only 3 chinook yearling collected for the whole month of July (**App. A-4**). The 10 and 90% passage dates for yearling chinook were 21 April and 20 May, respectively. Peak passage of 609 yearling chinook occurred on 21 April, 1 and 2 days after major hatchery releases from the **Entiat**

Table 1. Summary of brand recovery rates for yearling inook, sub-yearling chinook, and steelhead trout 1 April -31 August 1989, Rock Island Dam bypass trap.

|                                       |         |                 |                 | Bril@xifil~irSt. .... |                | Last 10% 50% 90%<br>recov. recov. recov. recov.<br>date date date date |                |                |                | Number<br>recov. | Percent<br>recov. |
|---------------------------------------|---------|-----------------|-----------------|-----------------------|----------------|--|----------------|----------------|----------------|------------------|-------------------|
| Species                               | Brand   | Release<br>date | Release<br>site | fish<br>released      | recov.<br>date | recov.<br>date   | recov.<br>date | recov.<br>date | recov.<br>date |                  |                   |
| Chinook<br>yearling                   | RA/7T/1 | Apr 20          | Entiat R.       | 17,500                | Apr 23         | May 20   | Apr 23         | Apr 28         | May 06         | 27               | 0.15              |
|                                       | RA/7T/3 | Apr 20          | Entiat R.       | 17,500                | Apr 22         | May 15   | Apr 24         | Apr 28         | May 12         | 22               | 0.13              |
|                                       | LA/7C/1 | Apr 19          | Wenat. R.       | 16,289                | Apr 21         | May 22   | Apr 21         | Apr 26         | May 19         | 35               | 0.21              |
|                                       | LA/7C/3 | Apr 19          | Wenat. R.       | 17,526                | Apt 21         | May 25   | Apr 21         | May 05         | May 17         | 39               | 0.22              |
|                                       | RD/7C/1 | Apr 19          | Wenat. R.       | 16,271                | Apr 21         | May 27   | Apr 21         | Apr 26         | May 19         | 27               | 0.17              |
|                                       | LA/IR/1 | May 03          | Wenat. R.       | 32,000                | May 05         | May 27   | May 05         | May 12         | May 19         | 124              | 0.39              |
|                                       | LA/IR/3 | May 03          | Wenat. R.       | 32,000                | May 05         | May 29   | May 05         | May 12         | May 19         | 119              | 0.37              |
|                                       | RA/IR/1 | May 03          | Wenat. R.       | 32,000                | May 05         | May 31   | May 05         | May 12         | May 19         | 88               | 0.28              |
|                                       | RA/IR/3 | May 03          | Wenat. R.       | 32,000                | May 04         | May 31   | May 05         | May 13         | May 21         | 82               | 0.26              |
|                                       | LD/7N/1 | Apr 18          | Methow R.       | 15,916                | Apr 23         | May 26   | Apr 28         | May 05         | May 25         | 11               | 0.07              |
|                                       | RA/7N/1 | Apt 18          | Methow R.       | 15,570                | Apr 25         | Jun 01   | May 03         | May 16         | May 25         | 19               | 0.12              |
|                                       | RA/7N/3 | Apr 18          | Methow R.       | 16,704                | May 01         | May 31   | May 05         | May 14         | May 22         | 22               | 0.13              |
|                                       | Total:  |                 |                 |                       | 261,276        |  |                |                |                |                  | 615               |
| Accelerated<br>chinook<br>subyearling | LA/IJ/1 | May 03          | Wenat. R.       | 31,250                | May 04         | Jun 27   | May 05         | Jun 01         | Jun 11         | 373              | 1.19              |
|                                       | LA/IJ/3 | May 03          | Wenat. R.       | 31,250                | May 04         | Jul 02   | May 05         | Jun 01         | Jun 12         | 319              | 1.02              |
|                                       | RA/IJ/1 | May 03          | Wenat. R.       | 31,250                | May 04         | Jul 01   | May 05         | Jun 01         | Jun 12         | 303              | 0.97              |
|                                       | RA/IJ/3 | May 03          | Wenat. R.       | 31,250                | May 04         | Jun 29   | May 05         | Jun 01         | Jun 14         | 309              | 0.99              |
|                                       | LA/IH/1 | May 03          | Wenat. R.       | 29,500                | May 04         | Jun 18   | May 05         | May 17         | May 26         | 438              | 1.48              |
|                                       | LA/IH/3 | May 03          | Wenat. R.       | 30,000                | May 05         | Jun 09   | May 05         | May 15         | May 26         | 529              | 1.76              |
|                                       | RA/IH/1 | May 03          | Wenat. R.       | 29,500                | May 04         | Jun 11   | May 05         | May 16         | May 24         | 485              | 1.64              |
|                                       | RA/IH/3 | May 03          | Wenat. R.       | 30,500                | May 05         | Jun 10   | May 05         | May 16         | May 28         | 695              | 2.28              |
|                                       | LA/IL/1 | May 03          | Wenat. R.       | 15,000                | May 04         | Jun 24   | May 05         | May 16         | May 30         | 263              | 1.75              |
|                                       | LA/IL/3 | May 03          | Wenat. R.       | 15,000                | May 04         | Jun 28   | May 05         | May 16         | Jun 01         | 251              | 1.67              |
|                                       | RA/IL/1 | May 03          | Wenat. R.       | 15,000                | May 05         | Jun 21   | May 05         | May 16         | May 31         | 158              | 1.05              |
|                                       | RA/IL/3 | May 03          | Wenat. R.       | 15,000                | May 04         | Jun 27   | May 05         | May 18         | Jun 02         | 246              | 1.64              |
|                                       | RA/IK/1 | May 03          | Wenat. R.       | 10,000                | May 04         | Jun 20   | May 05         | May 16         | Jun 07         | 99               | 0.99              |
|                                       | RA/IK/3 | May 03          | Wenat. R.       | 10,500                | May 04         | Jun 22   | May 05         | May 06         | Jun 04         | 82               | 0.78              |
|                                       | Total:  |                 |                 |                       | 325,000        |  |                |                |                |                  | 4,550             |
| Chinook<br>subyearling                | RA/T/ 1 | May 27          | Wells Dam       | 50,511                | May 27         | Jun 22   | May 30         | Jun 06         | Jun 11         | 135              | 0.27              |
|                                       | RA/T/3  | May 27          | Wells Dam       | 50,964                | May 27         | Jul 05   | May 30         | Jun 07         | Jun 12         | 143              | 0.28              |
|                                       | Total:  |                 |                 |                       | 101,475        |  |                |                |                | 278              | 0.27              |
| Steelhead                             | RD/7F/1 | Apr 28          | Smklmn R.       | 20,388                | May 04         | May 07   | May 12         | May 15         | May 23         | 203              | 1.00              |
|                                       | RD/7F/3 | Apt 28          | Smklmn R.       | 20,416                | May 04         | May 05   | May 11         | May 15         | May 21         | 202              | 0.99              |
|                                       | LA/7F/1 | Apr 26          | Methow R.       | 15,238                | May 02         | Jun 05   | May 06         | May 10         | May 16         | 66               | 0.43              |
|                                       | LA/7F/3 | Apr 26          | Methow R.       | [5, [91               | May02          | Jun 01   | May 05         | May 10         | May 17         | 67               | 0.44              |
| Total:                                |         |                 |                 | 71,233                |                |  |                |                |                | 538              | 0.76              |
| Grand<br>totals:                      | 32      |                 |                 | 758,984               |                |  |                |                |                | 5,981            | 0.79              |



Table 2. Rock Island Dam powerhouse operations expressed in KCFS and percent streamflow, 1 April -31 August, 1989 (monthly ranges appear in parenthesis).

|                  | Average KCFS                  |                        |                       |                       |                     |
|------------------|-------------------------------|------------------------|-----------------------|-----------------------|---------------------|
|                  | April                         | May                    | June                  | July                  | August              |
| Total river flow | 88.6<br>(34.3-151.3)          | 152.4<br>(100.6-191.0) | 111.6<br>(55.6-166.0) | 72.6<br>(44.9-100. 8) | 64.8<br>(45.6-80.9) |
| Powerhouse #1    | 12.0<br>(0.8-28.6)            | 25.4<br>(1.0-47.5)     | 20.8<br>(0.5-50.4)    | 5.23<br>(0.5-21.2)    | 6.2<br>(3.5-18.0)   |
| Powerhouse #2    | 66.8<br>(29.8-101.5)          | 97.0<br>(70.5-117.7)   | 89.6<br>(54.1-114.3)  | 66.3<br>(43.3-92.7)   | 57.7<br>(41.1-74.1) |
| Spill            | 11.5<br>(0.0-33.6)            | 28.9<br>(0.0-42.2)     | 0.1<br>(0.0-2.3)      | 0<br>(0)              | 0<br>(0)            |
|                  | Average percent of total flow |                        |                       |                       |                     |
|                  | April                         | May                    | June                  | July                  | August              |
| Powerhouse #1    | 13.1<br>(1.1-27.3)            | 16.4<br>(1.0-30.8)     | 15.1<br>(0.6-32.3)    | 6.6<br>(0.6-21.9)     | 9.4<br>(5.0-23.5)   |
| Powerhouse #2    | 77.7<br>(60.3-92.2)           | 63.9<br>(54.4-86.8)    | 83.7<br>(67.1-98.2)   | 91.9<br>(77.0-98.2)   | 89.1<br>(75.1-93.7) |
| Spill            | 8.2<br>(0.0-31.3)             | 18.9<br>(0.0-27.9)     | 0.1<br>(0.0-1.5)      | 0<br>(0)              | 0<br>(0)            |

Table 3. Comparison of actual, expanded, and the 5 year average of fish counts for passage dates for the Rock Island Dam bypass trap, 1989.

| Species                     |                 | Totals  | Numbers      |        |                | Date          |               |               |
|-----------------------------|-----------------|---------|--------------|--------|----------------|---------------|---------------|---------------|
|                             |                 |         | 10%          | 50%    | 90%            | 10%           | 50%           | 90%           |
| <i>Chinook yearling</i>     | Actual          | 10,252  | <b>1,025</b> | 5,126  | 9,227          | Apr 21        | May 3         | May 20        |
|                             | Expanded        | 15,502  | <b>1,550</b> | 7,751  | 13,952         | <b>Apr 21</b> | May 4         | May 20        |
|                             | 5 year avg.     | 21,564  | <b>2,156</b> | 10,782 | 19,408         | Apr 21        | May 7         | May 24        |
| <i>Chinook sub-yearling</i> | Actual          | 36,466  | 3,643        | 18,213 | 32,783         | May 14        | <b>Jul 3</b>  | <b>Jul 27</b> |
|                             | Expanded        | 44,198  | 4,420        | 22,100 | 39,779         | May 10        | Jun 27        | <b>Jul 26</b> |
|                             | 5 year avg.     | 29,259  | 2,926        | 14,630 | 26,333         | Jun 3         | <b>Jul 2</b>  | Aug 2         |
| <i>Steelhead</i>            | Actual          | 25,004  | 2,500        | 12,502 | 22,504         | May 9         | May 17        | Jun 6         |
|                             | Expanded        | 38,457  | 3,846        | 19,229 | 34,611         | May 9         | May <b>17</b> | Jun 6         |
|                             | 5 year avg.     | 26,614  | 2,661        | 13,307 | 23,953         | May 6         | May 18        | May 31        |
| <i>Coho</i>                 | Actual          | 24,558  | 2,456        | 12,279 | 22,102         | May 15        | May 22        | May 30        |
|                             | <b>Expanded</b> | 37,833  | 3,783        | 18,917 | 34,050         | May 15        | May 22        | May 29        |
|                             | 5 year avg.     | 26,313  | 2,631        | 13,157 | 23,682         | May 15        | May 22        | May 30        |
| <i>Sockeye</i>              | <b>Actual</b>   | 19,812  | <b>1,981</b> | 9,906  | 17,831         | Apr 16        | Apr 20        | May 11        |
|                             | Expanded        | 26,469  | 2,647        | 13,235 | 23,822         | Apr 16        | Apr 22        | May 13        |
|                             | 5 year avg.     | 23,041  | 2,304        | 11,520 | 20,737         | Apr 15        | Apr 30        | May 30        |
| <i>Total yearlings</i>      | Actual          | 79,630  | 7,963        | 39,813 | 71,663         | Apr <b>17</b> | May 16        | May 30        |
|                             | Expanded        | 118,261 | 11,826       | 59,131 | 106,435        | Apr 18        | May 16        | May 29        |
|                             | 5 year avg.     | 97,474  | 9,747        | 48,737 | 87,727         | Apr 21        | May 17        | May 29        |
| <i>Total salmonids</i>      | Actual          | 116,092 | 11,605       | 58,026 | <b>104,447</b> | Apr 18        | May 20        | Jul 8         |
|                             | Expanded        | 162,460 | 16,246       | 81,230 | <b>146,214</b> | Apr 21        | May <b>19</b> | Jul 6         |
|                             | 5 year avg.     | 126,733 | 12,673       | 63,367 | <b>114,060</b> | Apr 23        | May 21        | Jul 7         |

<sup>a</sup> 5 year average taken from actual counts.

and Leavenworth national fish hatcheries, respectively (Table 1). The 90% passage date of chinook yearlings in 1989 was 4 days earlier than the 5 year average, while the 10 and 50% passage dates were within 1 day of the 5 year average ( Table 3, App. C-1).

### **Sub-yearling chinook**

A total of 36,466 chinook sub-yearlings were captured at the bypass trap in 1989 (App. A-6). Sub-yearling chinook were collected each day from 1 April to 31 August. Peak passage of 2,399 sub-yearling chinook occurred on 6 July. The 10 and 90% passage dates were 14 May and 27 July, respectively, while the 50% passage date for sub-yearling chinook was 3 July (Table 3, App. C-2). Fork length measurements were taken from sub-yearling chinook between 30 May and 11 August (Figure 6).

For the second year in row, an experiment was conducted by Parametric of Bellevue, Washington to determine the effect of accelerated growth on smoltification of sub-yearling chinook. These fish were included in the daily number of sub-yearling chinook that were sampled, and account for the large number of sub-yearlings in the catch in May (App. A-2, A-3, and C-2).

There was a large difference between the 10% passage date of sub-yearlings between 1989 and the 5 year average (Table 3, App. C-2). This difference can be attributed to the large number of accelerated growth sub-yearlings that were captured on 4 May (Apps. C-2, and E-2).

### **Steelhead**

A total of 25,004 steelhead smelts were collected at the bypass trap in 1989 (App. A-6). Daily collection of steelhead smelts began on 5 April and continued until 17 July, after which, steelhead were intermittently collected in low numbers ( < 10) until 30 August. Peak passage of 1,956 steelhead occurred on 16 May, 1 day prior to the 50% passage date. The 10 and 90% passage dates were 9 May and 6 June, respectively (Table 3, App. C-3), which were 3 and 7 days, later than the 5 year average. A larger number of steelhead were captured at the bypass trap in the first 15 days of June than is usually observed (App. C-3). This number might have been influenced by the presence of rainbow trout that were released from Lake Roosevelt.

In 1989, rainbow trout that were released into Lake Roosevelt (above Grand Coulee Dam) were collected at the Rock Island Dam bypass trap (Peven 1989). Positive identification of these fish was possible because some of the fish were tagged (Al Scholz, pers. comm.). These fish were of obvious hatchery origin, because of the condition of their dorsal fins, and were included in the number of hatchery fish sampled per day, even though they all had adipose fins present. For a period between 19 May and 27 June, the number of Lake Roosevelt rainbow trout (distinguished from steelhead by morphological characteristics) were enumerated on a daily basis. We found that these fish made up

FREQUENCY

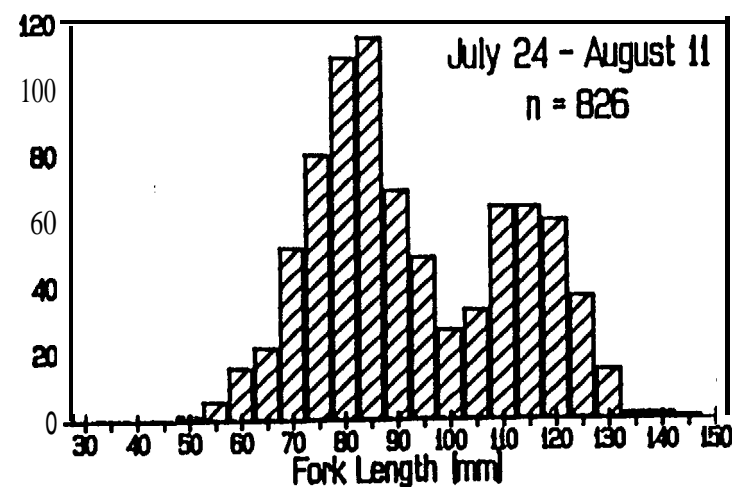
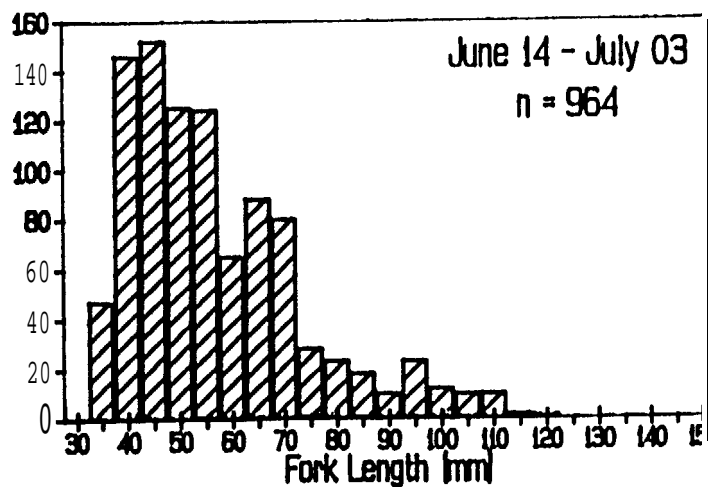
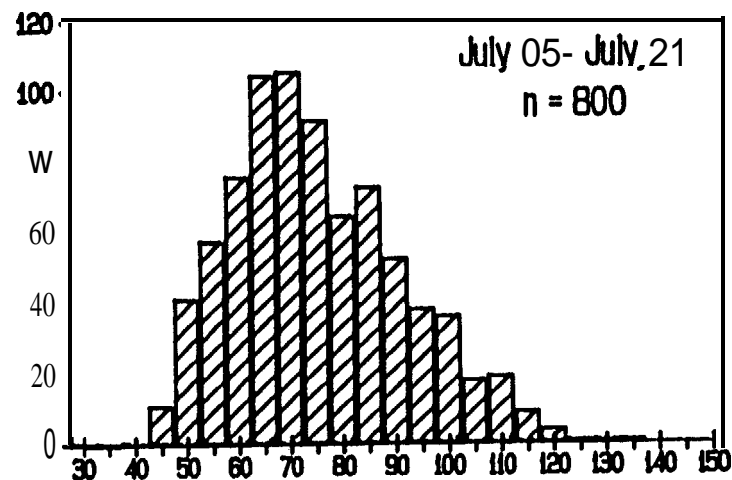
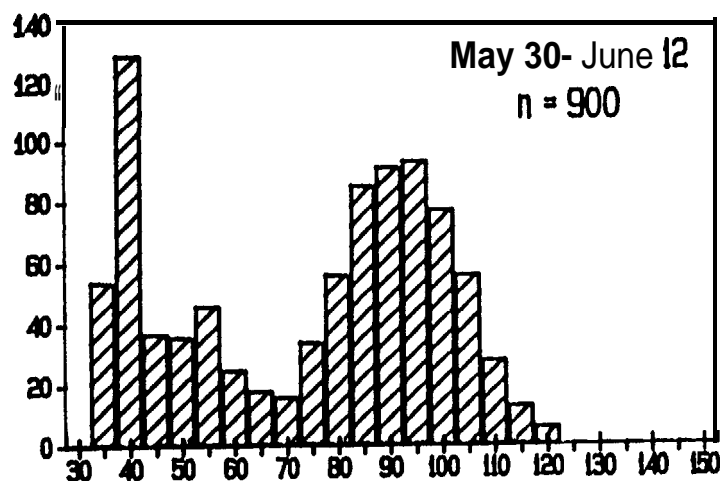


Figure 6. Length frequency histograms of sub-yearling chinook salmon, collected at the Rock Island Dam bypass trap, 30 May - 11 August.

Fork length measurements were obtained from PIT tagging data and are presented in Figure 7 (from Peven 1989). Fork length measurements have been sampled from steelhead since 1986 to index the difference between hatchery and naturally produced components of the run. Hatchery smelts averaged 21 mm F. L. longer than naturally produced smelts and made up approximately 82% of the steelhead juveniles sampled at the bypass trap in 1989 (Peven 1989), although the proportion of hatchery steelhead was influenced by the presence of the Lake Roosevelt rainbow trout.

### Sockeye

A total of 19,812 sockeye smelts were collected at the bypass trap in 1989 (App. A-6). Sockeye smelts were present at Rock Island Dam on the second day of the monitoring program, 2 April. The last sockeye smelt was trapped on 15 August. Peak passage occurred on 17 April when 3,147 sockeye smelts were collected. The 10 and 90% passage dates were 16 April and 11 May, respectively, while 50% of the outmigrating sockeye smelts had passed Rock Island Dam by 20 May (Appendix C-4). For the second year in a row, the sockeye outmigration was condensed into a narrower time frame than the running average (1985 - 1989). While the 10% passage date was within 1 day of the 5 year average, the 50 and 90% passage dates were 10 and 19 days, respectively earlier than the 5 year average (Table 3, App. C-5).

In 1989, the downstream migration of sockeye was not as strongly bimodal as in the previous years (App. C-5). The usual bimodal run timing occurs because two stocks of sockeye pass Rock Island Dam on their seaward migration (Okanogan and Wenatchee rivers). Wenatchee River outmigrants pass Rock Island Dam primarily in April and Okanogan River smelts are more prevalent at Rock Island Dam in May (Peven 1987). It appears that in 1988 and 1989, the Okanogan stock of sockeye did not migrate in large numbers (Peven 1988, 1989 in preparation; Jim McGee, pers. comm.). The earlier 50 and 90% passage dates of the sockeye run at Rock Island Dam this year is further evidence of the failure of the Lake Osoyoos sockeye run. Length frequencies were taken from sockeye smelts between 7 April and 22 June (Figure 8). Length frequency data has been collected from sockeye smelts since 1986 to distinguish between the two stocks that migrate past the dam.

This year we saw a sizeable number of sockeye that were extremely large (> 275 mm F. L.), that were not included in the daily retch. Between 27 May and 21 July, we counted 348 of these fish at the bypass trap (although they were present before 27 May). Because of the large size of these individuals, we were uncertain if these fish were downstream migrants, or perhaps kokanee that escaped from Lake Roosevelt or other lakes upstream. Otoliths were taken from approximately 15 fish that were already dead when found in the bypass trap. The age readings that we obtained from the otoliths showed that these fish were at least 3 years old, with some of the fish aged as 5 years old, which would make it extremely unlikely that they were smelts.

### Coho

A total of 24,558 coho (0. kisutch) were captured at the bypass trap in 1989 (App. A-6). Daily collection of coho smelts began on 28 April and continued until 18 June (App. A-1 - A-3). The last coho was collected on 28 June. Peak passage of 2,756 coho smelts

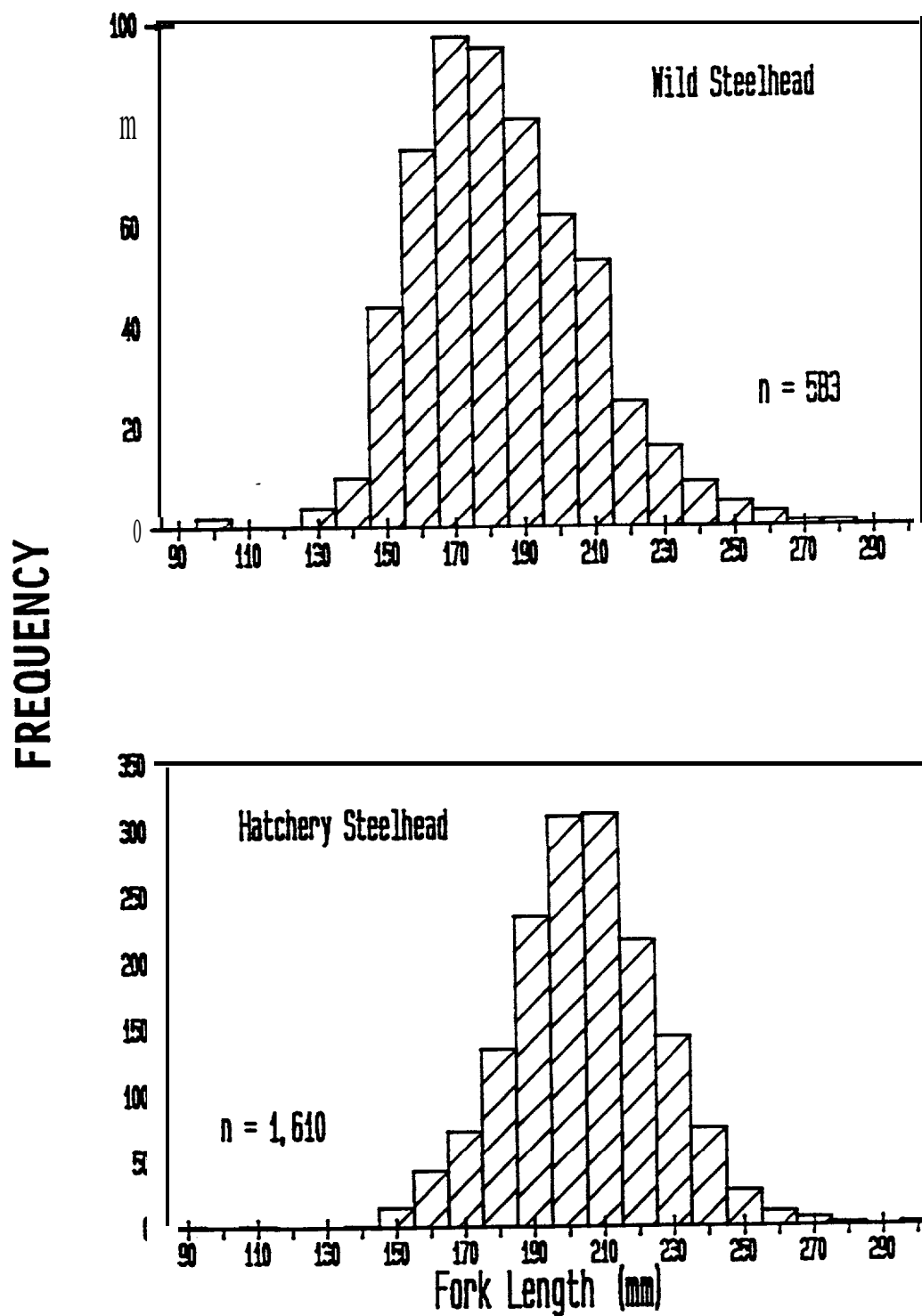


Figure 7. Length frequency histograms of hatchery and naturally produced steelhead trout smelts collected at the Rock Island Dam bypass trap, 1989.

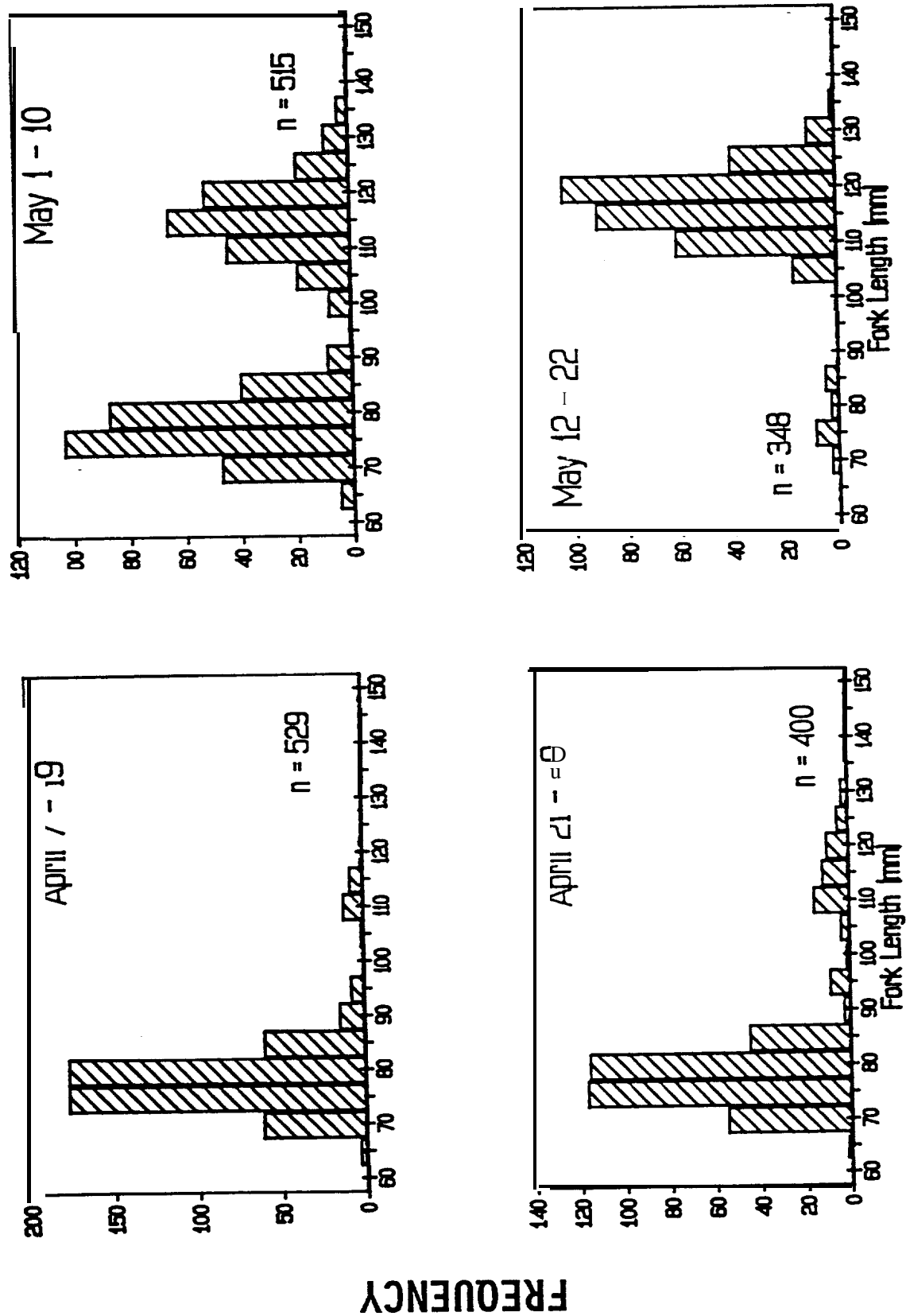


Figure 8. Length frequency histograms of sockeye smolts collected at the Rock Island Dam bypass trap, 1989.

occurred on 22 May (Appendix A-2, C-5). The 10, 50, and 90% passage dates for coho were 15, 22, and 30 May, respectively. The 10, 50, and 90% passage dates for coho in 1989 were exactly the same as the 5 year average (App. C-4).

### **Total salmonid run**

A total of 116,092 juvenile salmonids were collected at the bypass trap in 1989. The total salmonid run timing is represented in Appendix C-6. The early peak passage count of 3,384 on 17 April was largely influenced by the large collection of Wenatchee stock sockeye (n = 3,147). The 16 May peak count of 3,606 was mostly coho (n = 973) and steelhead (n = 1,956) (App. A-1, A-2, C-6).

The effect of sub-yearling chinook was assessed on the 10, 50, and 90% dates for the total cumulative juvenile salmonid migration. A comparison was made between 1989 and the five year average (1985 - 1989) between the total juvenile outmigration past Rock Island Dam and the outmigration excluding sub-yearling chinook (Figures 9). The duration of the middle 80% of the total juvenile salmonid passage (10% date to 90% date) was 81 days, 18 April to 8 July with a 50% passage date on 20 May, compared to a 75 day duration for the 5 year average, with 10, 50, and 90% passage dates: 23 April, 21 May, and 7 July, respectively (Table 3, Figure 9). Excluding sub-yearling chinook from this analysis results in a spring migrant run duration of 43 days, 17 April to 30 May, with a 50% passage date on 16 May, compared to a 38 day duration for the five year average, with 10, 50, and 90% passage dates: 21 April, 17 May, and 29 May, respectively (Table 3, Figure 9, App. C-7).

In summary, in 1989, sub-yearling chinook extend the juvenile migration 90% passage date 39 days; from 30 May (spring migration) to 8 July (total migration). Run timing in 1989 was slightly longer than the five year average. The middle 80% of the total juvenile salmonid migration past Rock Island Dam in 1989 was 81 days compared to 75 days for the five year average. Excluding sub-yearlings from this comparison, the spring migration past the dam in 1989 was 43 days, compared to 38 days for the five year average.

## **II. MARKED FISH RECOVERIES**

Thirty two groups of freeze branded hatchery fish totaling 758,984 fish (Table 1), were released into the Columbia River system upstream from Rock Island Dam to evaluate the relationships between Columbia River flow rates and travel time. These releases consisted of 261,276 chinook yearlings (48.9% were controls released from Leavenworth as part of the Parametric study), 325,000 accelerated growth chinook sub-yearlings released from the Leavenworth hatchery, 101,475 sub-yearling chinook released at Wells Dam, 40,804 steelhead released into the Similkameen River, and 30,429 steelhead released into the Methow River. Table 1 presents information concerning these releases as well as recovery data, including: first, last, 10, 50, and 90% recovery dates and number and percent recapture of each release group.

### **Leavenworth National Fish Hatchery**

#### **Yearling chinook**

The first brand recovery at Rock Island Dam was on 21 April, consisting of yearling chinook from Leavenworth National Fish Hatchery that were released on 19 April. The



NUMBERS OF FISH PER DAY  
(THOUSANDS)

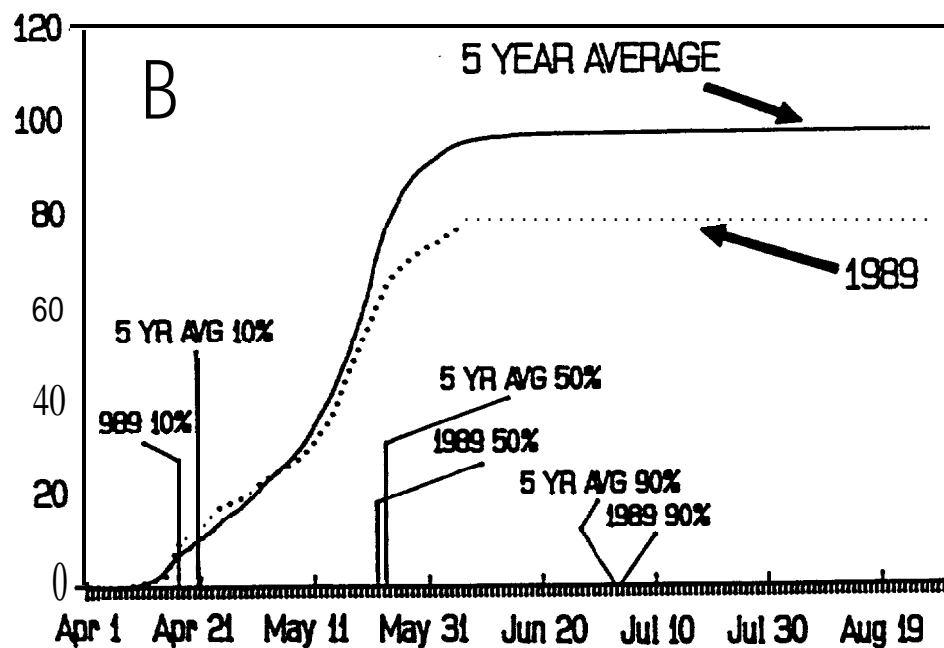
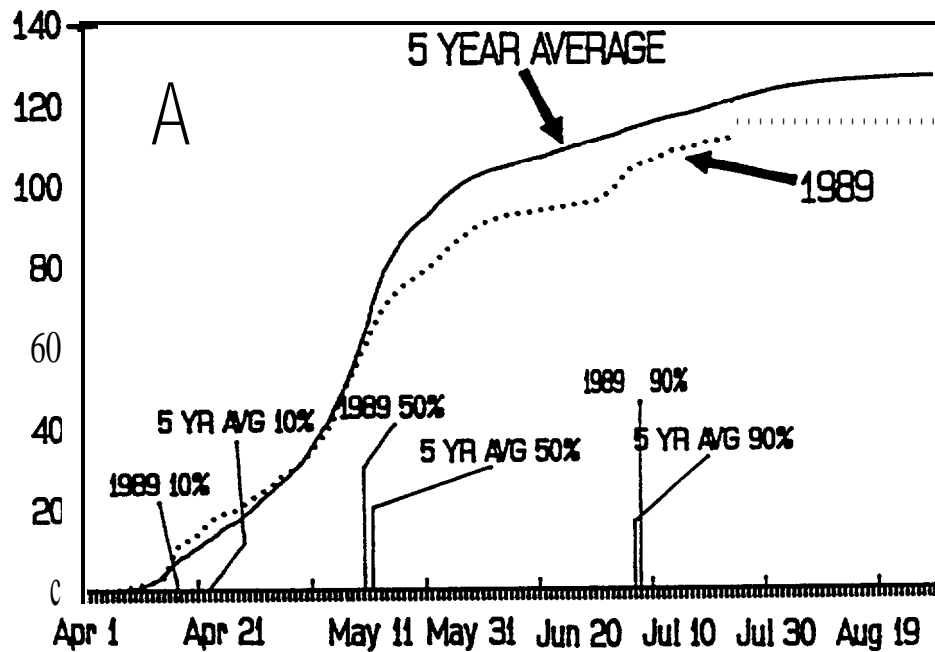


Figure 9. Comparison of the cumulative total juvenile salmonid passage at Rock Island Dam between 1989 and the five year average (A), and a comparison of the cumulative juvenile migration excluding sub-yearling chinook for 1989 and the five year average.

**50% recovery** date at Rock Island Dam for the 3 groups of **Leavenworth** branded yearling spring chinook were 26 April and 5 May, resulting in a median travel time of 7 and 16 days (Table 1). Final recovery of Leavenworth branded chinook occurred on 27 May. The Rock Island Dam bypass trap sampled 0.17- 0.22% of the fish in this release (Table 1). Other releases of yearling chinook from the Leavenworth hatchery were part of 'the Parametric experiment and had median passage dates ranging from 9 to 10 days (Table 1). These fish enter the Columbia River 15 miles above Rock Island Dam and, as a **result**, Columbia River flows had less influence on travel time to Rock Island Dam for this group compared to fish released above Rocky Reach Dam.

#### **Accelerated growth sub-yearling chinook**

Fourteen groups of accelerated growth chinook sub-yearlings were released from the Leavenworth hatchery on 3 May. Median travel times for these groups ranged from 3-29 days, and the bypass trap collected between 0.78 to 2.28% of these fish (Table 1).

Winthrop National Fish Hatchery

#### **Yearling chinook**

Three groups of yearling chinook were released into the Methow River on 18 April (Table 1). The median passage times for these groups of fish were 17, 25, and 27 days. The fish released into the Methow River traveled a longer distance before reaching Rock Island Dam than did the fish released into the Wenatchee River. The Rock Island Dam bypass trap sampled 0.7- 0.13% of these released fish (Table 1).

Entiat National Fish Hatchery

#### **Yearling chinook**

Two groups of yearling chinook were released into the Entiat River on 20 April. The median passage date for these groups were 8 days (Table 1). We sampled 0.13 and 0.15% of these two groups (Table 1.)

**Wells Dam Fish Hatchery (WDF and WDW)**

#### **Sub-yearling chinook**

Two groups of branded sub-yearling chinook were released from Wells Dam on 27 May. The median travel time to Rock Island Dam for these groups were 10 and 11 days and the bypass trap collected 0.27 and 0.28% of the marked fish from this release (Table 1). These fish had a shorter travel distance than the yearling chinook released in the Methow River.

#### **Steelhead**

Marked steelhead were released on 26 April into the Methow River and 28 April into the **Similkameen** River (Table 1). Median travel times of the two groups of fish released in the **Similkameen** River were 17 days. The median travel times for the two groups of steelhead released into the Methow River were 12 days (Table 1). Steelhead migrated downstream faster than did chinook yearlings traveling approximately the same distance. Of the branded steelhead released, recoveries ranged from 0.43 to 1.00% at the Rock Island Dam bypass trap (Table 1).

## suMMARY

Between 1 April and 31 **August**, 1989, 116,092 downstream migrating **salmonids** were collected at the Rock Island Dam bypass trap. Freeze branded fish collected consisted of 5,443 chinook salmon and 538 **steelhead** trout. In **addition**, 5,913 chinook and 20,485 steelhead were collected that had clipped adipose fins.

The middle 80% of the **salmonid outmigration** passed Rock Island Dam between 18 April and 8 July, 1989, a 81 day period. The dates and duration of the **outmigration** were extended by sub-yearling chinook. If sub-yearling chinook are excluded from analysis, the middle 80% of the **outmigration** was 17 April to 30 May, a 43 day period. Sub-yearling chinook comprised 31% of the fish collected at Rock Island Dam.

## ACKNOWLEDGMENTS

This monitoring effort was funded by the **Bonneville** Power Administration, U.S. Department of Energy, as a part of the Northwest Power Planning Council's program to protect, mitigate, and enhance fish and wildlife affected by hydroelectric facilities in the Columbia **River** Basin. The study was coordinated through the Fish Passage Center. Jennifer Jordan and Larry Basham of the FPC were very helpful throughout the study. Dave Marvin of FPC assisted in the PIT tagging program. The Public Utility District No. 1 of **Chelan** County conducted the smelt monitoring at Rock Island Dam and a number of **district** employees assisted with the study. **Dick Nason**, Steve Hays, and Paul Fielder provided administrative and logistical help as well as information and advise. The following individuals assisted with the trap monitoring and data **input** into the computer: N. Duree, O. Heath, B. Keesee, K. Truscott, R. **Yanak**, K Bums, and M. Garner.

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## **Appendix A**

**Daily salmonid catch, Rock Island Dam bypass trap, 1 April -31 August**

Appendix A-1. Daily **salmonid** catch, Rock Island Dam bypass trap, April, 1989.

| DATE           | CHINOOK<br>YEARLING | CHINOOK<br>SUB-YEAR. | STLHD.     | COHO | SOCKEYE      | TOTAL<br>SALMONID. | TOTAL<br>YEARLING |
|----------------|---------------------|----------------------|------------|------|--------------|--------------------|-------------------|
| 01-Apr-89      | 10                  | 12                   | 0          | 1    | 0            | 23                 | 11                |
| 02-Apr-89      | 4                   | 70                   | 0          | 0    | 1            | 75                 | 5                 |
| 03-Apr-89      | 2                   | 22                   | 0          | 0    | 2            | 26                 | 4                 |
| 04-Apr-89      | 8                   | 31                   | 0          | 0    | 4            | 43                 | 12                |
| 05-Apr-89      | 7                   | 24                   | 2          | 0    | 3            | 36                 | 12                |
| 06-Apr-89      | 0                   | 34                   | 2          | 0    | 4            | 40                 | 6                 |
| 07-Apr-89      | 3                   | 74                   | 3          | 0    | 34           | 114                | 40                |
| 08-Apr-89      | 19                  | 80                   | 3          | 0    | 94           | 196                | 116               |
| 09-Apr-89      | 22                  | 106                  | 20         | 0    | 316          | 464                | 358               |
| 10-Apr-89      | 12                  | 53                   | 13         | 0    | 38           | 116                | 63                |
| 11-Apr-89      | 60                  | 63                   | 22         | 0    | 278          | 423                | 360               |
| 12-Apr-89      | 86                  | 61                   | 22         | 0    | 165          | 334                | 273               |
| 13-Apr-89      | 60                  | 132                  | 41         | 0    | 49           | 282                | 150               |
| 14-Apr-89      | 54                  | 81                   | 36         | 0    | 151          | 322                | 241               |
| 15-Apr-89      | 238                 | 71                   | 35         | 0    | 498          | 842                | 771               |
| 16-Apr-89      | 153                 | 122                  | 57         | 0    | 2723         | 3055               | 2933              |
| 17-Apr-89      | 87                  | 79                   | 70         | 1    | 3147         | 3384               | 3305              |
| 18-Apr-89      | 69                  | 60                   | 65         | 0    | 2000         | 2194               | 2134              |
| 19-Apr-89      | 32                  | 33                   | 25         | 0    | 342          | 432                | 399               |
| 20-Apr-89      | 59                  | 42                   | 26         | 0    | 174          | 301                | 259               |
| 21-Apr-89      | 609                 | 19                   | 26         | 0    | 672          | 1326               | 1307              |
| 22-Apr-89      | 438                 | 9                    | 18         | 0    | 971          | 1436               | 1427              |
| 23-Apr-89      | 242                 | 23                   | 11         | 0    | 1254         | 1530               | 1507              |
| 24-Apr-89      | 170                 | 21                   | 35         | 0    | 962          | 1188               | 1167              |
| 25-Apr-89      | 289                 | 28                   | 27         | 0    | 387          | 731                | 703               |
| 26-Apr-89      | 238                 | 24                   | 49         | 0    | 159          | 470                | 446               |
| 27-Apr-89      | 194                 | 23                   | 60         | 0    | 122          | 399                | 376               |
| 28-Apr-89      | 178                 | 17                   | 53         | 2    | 145          | 395                | 378               |
| 29-Apr-89      | 312                 | 9                    | 56         | 39   | 752          | 1168               | 1159              |
| 30-Apr-89      | 387                 | 26                   | 63         | 54   | 416          | 946                | 920               |
| <b>Totals:</b> | <b>4042</b>         | 1449                 | <b>840</b> | 97   | <b>15863</b> | 22291              | 20842             |

Appendix A-2. Daily salmonid catch, Rock Island Dam bypass trap, May, 1989.

| DATE             | CHINOOK<br>YEARLING | CHINOOK<br>SUB-YEAR. | STLHD.       | COHO         | SOCKEYE    | TOTAL<br>SALMONID- | TOTAL<br>YEARLING |
|------------------|---------------------|----------------------|--------------|--------------|------------|--------------------|-------------------|
| 01-May-89        | 424                 | 24                   | 88           | 39           | 418        | 993                | 969               |
| <b>02-May-89</b> | 389                 | 13                   | 129          | 94           | 312        | 937                | 924               |
| <b>03-May-89</b> | 326                 | 23                   | 127          | 53           | 375        | 904                | 881               |
| <b>04-May-89</b> | 283                 | 39                   | 143          | 56           | 215        | 736                | 697               |
| <b>05-May-89</b> | 500                 | 1023                 | 223          | 31           | 46         | 1823               | 800               |
| <b>06-May-89</b> | 408                 | 293                  | <b>270</b>   | 39           | 47         | 1057               | 764               |
| 07-May-89        | 295                 | 32                   | 284          | 20           | 20         | 651                | 619               |
| 08-May-89        | 156                 | 54                   | 376          | 89           | 55         | 730                | 676               |
| 09-May-89        | 240                 | 67                   | 531          | 144          | 263        | 1245               | 1178              |
| 10-May-89        | 289                 | <b>167</b>           | 506          | 327          | 137        | <b>1426</b>        | <b>1259</b>       |
| 11-May-89        | 203                 | <b>170</b>           | 811          | 285          | <b>121</b> | 1590               | 1420              |
| 12-May-89        | 261                 | 146                  | 1179         | 241          | 127        | 1954               | 1808              |
| 13-May-89        | 183                 | 85                   | 786          | 231          | 140        | 1425               | 1340              |
| 14-May-89        | 214                 | 108                  | <b>1340</b>  | 449          | 89         | 2200               | 2092              |
| 15-May-89        | 206                 | 155                  | <b>1554</b>  | 732          | 220        | 2867               | <b>2712</b>       |
| 16-May-89        | 207                 | 235                  | 1956         | 973          | 235        | 3606               | 3371              |
| 17-May-89        | 212                 | 219                  | 1709         | 1178         | 131        | 3449               | 3230              |
| 18-May-89        | 193                 | 189                  | <b>1373</b>  | 1248         | 126        | 3129               | 2940              |
| 19-May-89        | <b>174</b>          | 187                  | <b>1137</b>  | 1259         | 65         | 2822               | 2635              |
| 20-May-89        | <b>141</b>          | 225                  | <b>804</b>   | 1844         | 85         | 3099               | 2874              |
| 21-May-89        | 105                 | 159                  | 623          | 1505         | 44         | 2436               | 2277              |
| 22-May-89        | 149                 | <b>252</b>           | 585          | 2756         | 40         | 3782               | 3530              |
| 23-May-89        | 95                  | <b>150</b>           | 380          | 1778         | 42         | 2445               | 2295              |
| 24-May-89        | 76                  | <b>113</b>           | 386          | <b>2113</b>  | 34         | 2722               | 2609              |
| 25-May-89        | 73                  | <b>92</b>            | 284          | 1417         | 23         | 1889               | 1797              |
| 26-May-89        | 40                  | 99                   | <b>205</b>   | 942          | 16         | 1302               | 1203              |
| 27-May-89        | 95                  | <b>69</b>            | 289          | 905          | 8          | <b>1366</b>        | 1297              |
| 28-May-89        | 69                  | 173                  | <b>292</b>   | 530          | 6          | 1070               | 897               |
| 29-May-89        | <b>21</b>           | <b>64</b>            | 189          | 687          | <b>17</b>  | 978                | 914               |
| 30-May-89        | <b>17</b>           | <b>108</b>           | <b>222</b>   | 765          | 22         | 1134               | 1026              |
| 31-May-89        | <b>12</b>           | 172                  | 186          | <b>432</b>   | <b>14</b>  | 816                | <b>644</b>        |
| Totals:          | 6056                | <b>4905</b>          | <b>18967</b> | <b>23162</b> | 3493       | 56583              | 51678             |

Appendix A-3. Daily salmonid catch, Rock Island Dam bypass trap, June, 1989.

| DATE      | CHINOOK<br>YEARLING | CHINOOK<br>SUB-YEAR. | STLHD. | COHO | SOCKEYE | TOTAL<br>SALMONID | TOTAL<br>YEARLING |
|-----------|---------------------|----------------------|--------|------|---------|-------------------|-------------------|
| 01-Jun-89 | 14                  | 464                  | 205    | 418  | 17      | 1118              | 654               |
| 02-Jun-89 | 15                  | 623                  | 212    | 252  | 32      | 1134              | 511               |
| 03-Jun-89 | 37                  | 464                  | 528    | 231  | 58      | 1318              | 8 5 4             |
| 04-Jun-89 | 24                  | 486                  | 606    | 157  | 45      | 1318              | 832               |
| 05-Jun-89 | 8                   | 562                  | 707    | 90   | 23      | 1390              | 828               |
| 06-Jun-89 | 7                   | 537                  | 529    | 42   | 17      | 1132              | 595               |
| 07-Jun-89 | 5                   | 642                  | 315    | 33   | 16      | 1011              | 369               |
| 08-Jun-89 | 3                   | 683                  | 300    | 20   | 19      | 1025              | 342               |
| 09-Jun-89 | 3                   | 780                  | 300    | 13   | 32      | 1128              | 348               |
| 10-Jun-89 | 10                  | 423                  | 272    | 4    | 10      | 719               | 296               |
| 11-Jun-89 | 7                   | 550                  | 206    | 11   | 21      | 795               | 245               |
| 12-Jun-89 | 3                   | 512                  | 104    | 3    | 12      | 634               | 122               |
| 13-Jun-89 | 2                   | 274                  | 114    | 7    | 8       | 405               | 131               |
| 14-Jun-89 | 1                   | 319                  | 122    | 5    | 8       | 455               | 136               |
| 15-Jun-89 | 2                   | 231                  | 103    | 4    | 3       | 343               | 112               |
| 16-Jun-89 | 0                   | 181                  | 104    | 3    | 0       | 288               | 107               |
| 17-Jun-89 | 2                   | 132                  | 42     | 4    | 3       | 183               | 51                |
| 18-Jun-89 | 2                   | 129                  | 13     | 1    | 3       | 148               | 19                |
| 19-Jun-89 | 0                   | 110                  | 10     | 0    | 1       | 121               | 11                |
| 20-Jun-89 | 2                   | 229                  | 46     | 0    | 4       | 281               | 52                |
| 21-Jun-89 | 1                   | 217                  | 23     | 0    | 6       | 247               | 30                |
| 22-Jun-89 | 2                   | 174                  | 11     | 0    | 2       | 189               | 15                |
| 23-Jun-89 | 0                   | 197                  | 28     | 0    | 1       | 226               | 29                |
| 24-Jun-89 | 1                   | 161                  | 29     | 0    | 2       | 193               | 32                |
| 25-Jun-89 | 0                   | 199                  | 25     | 0    | 4       | 228               | 29                |
| 26-Jun-89 | 0                   | 266                  | 24     | 0    | 4       | 294               | 28                |
| 27-Jun-89 | 0                   | 295                  | 32     | 0    | 2       | 329               | 34                |
| 28-Jun-89 | 0                   | 198                  | 28     | 1    | 2       | 229               | 31                |
| 29-Jun-89 | 0                   | 186                  | 18     | 0    | 2       | 206               | 20                |
| 30-Jun-89 | 0                   | 193                  | 10     | 0    | 1       | 204               | 11                |
| Totals:   | 151                 | 10417                | 5066   | 1299 | 358     | 17291             | 6874              |



Appendix A-4. Daily salmonid catch, Rock Island Dam bypass trap, July, 1989.

| DATE      | CHINOOK CHINOOK |           | STLHD. | COHO | SOCKEYE | TOTAL    | TOTAL    |
|-----------|-----------------|-----------|--------|------|---------|----------|----------|
|           | YEARLING        | SUB-YEAR. |        |      |         | SALMONID | YEARLING |
| 01-Jul-89 | 0               | 438       | 7      | 0    | 5       | 450      | 12       |
| 02-Jul-89 | 0               | 908       | 6      | 0    | 5       | 919      | 11       |
| 03-Jul-89 | 0               | 704       | 6      | 0    | 1       | 711      | 7        |
| 04-Jul-89 | 0               | 1156      | 5      | 0    | 4       | 1165     | 9        |
| 05-Jul-89 | 0               | 1260      | 5      | 0    | 13      | 1278     | 18       |
| 06-Jul-89 | 1               | 2238      | 7      | 0    | 10      | 2256     | 18       |
| 07-Jul-89 | 0               | 1146      | 12     | 0    | 6       | 1164     | 18       |
| 08-Jul-89 | 0               | 694       | 6      | 0    | 7       | 707      | 13       |
| 09-Jul-89 | 1               | 806       | 7      | 0    | 2       | 816      | 10       |
| 10-Jul-89 | 0               | 343       | 5      | 0    | 0       | 348      | 5        |
| 11-Jul-89 | 0               | 593       | 11     | 0    | 1       | 605      | 12       |
| 12-Jul-89 | 0               | 601       | 10     | 0    | 3       | 614      | 13       |
| 13-Jul-89 | 0               | 644       | 6      | 0    | 6       | 656      | 12       |
| 14-Jul-89 | 0               | 719       | 5      | 0    | 9       | 733      | 14       |
| 15-Jul-89 | 0               | 309       | 4      | 0    | 2       | 315      | 6        |
| 16-Jul-89 | 0               | 211       | 3      | 0    | 1       | 215      | 4        |
| 17-Jul-89 | 0               | 194       | 0      | 0    | 0       | 194      | 0        |
| 18-Jul-89 | 0               | 329       | 2      | 0    | 2       | 333      | 4        |
| 19-Jul-89 | 0               | 414       | 2      | 0    | 2       | 418      | 4        |
| 20-Jul-89 | 0               | 535       | 0      | 0    | 3       | 538      | 3        |
| 21-Jul-89 | 0               | 204       | 0      | 0    | 1       | 205      |          |
| 22-Jul-89 | 0               | 264       | 0      | 0    | 1       | 265      | 1        |
| 23-Jul-89 | 1               | 143       | 1      | 0    | 0       | 145      | 2        |
| 24-Jul-89 | 0               | 216       | 1      | 0    | 0       | 217      | 1        |
| 25-Jul-89 | 0               | 337       | 0      | 0    | 0       | 337      | 0        |
| 26-Jul-89 | 0               | 491       | 1      | 0    | 0       | 492      |          |
| 27-Jul-89 | 0               | 373       | 0      | 0    | 1       | 374      |          |
| 28-Jul-89 | 0               | 227       | 1      | 0    | 0       | 228      | 1        |
| 29-Jul-89 | 0               | 281       | 2      | 0    | 0       | 283      | ?        |
| 30-Jul-89 | 0               | 270       | 2      | 0    | 0       | 272      | 2        |
| 31-Jul-89 | 0               | 214       | 0      | 0    | 0       | 214      | 0        |
| Totals:   | 3               | 17262     | 117    | 0    | 85      | 17467    | 205      |

Appendix A-5. Daily salmonid catch, Rock Island Dam bypass trap, August, 1989.

| DATE      | CHINOOK CHINOOK |           | STLHD. | COHO | SOCKEYE | TOTAL    | TOTAL    |
|-----------|-----------------|-----------|--------|------|---------|----------|----------|
|           | YEARLING        | SUB-YEAR. |        |      |         | SALMONID | YEARLING |
| 01-Aug-89 | 0               | 290       | 0      | 0    | 1       | 291      | 1        |
| 02-Aug-89 | 0               | 212       | 0      | 0    | 1       | 213      | 1        |
| 03-Aug-89 | 0               | 138       | 0      | 0    | 0       | 138      | 0        |
| 04-Aug-89 | 0               | 157       | 2      | 0    | 3       | 162      | 5        |
| 05-Aug-89 | 0               | 189       | 0      | 0    | 1       | 190      | 1        |
| 06-Aug-89 | 0               | 161       | 0      | 0    | 2       | 163      | 2        |
| 07-Aug-89 | 0               | 81        | 2      | 0    | 0       | 83       | 2        |
| 08-Aug-89 | 0               | 124       | 1      | 0    | 2       | 127      | 3        |
| 09-Aug-89 | 0               | 106       | 0      | 0    | 0       | 106      | 0        |
| 10-Aug-89 | 0               | 85        | 2      | 0    | 0       | 87       | 2        |
| 11-Aug-89 | 0               | 51        | 0      | 0    | 0       | 51       | 0        |
| 12-Aug-89 | 0               | 29        | 0      | 0    | 1       | 30       | 1        |
| 13-Aug-89 | 0               | 40        | 1      | 0    | 0       | 41       | 1        |
| 14-Aug-89 | 0               | 52        | 0      | 0    | 0       | 52       | 0        |
| 15-Aug-89 | 0               | 24        | 0      | 0    | 2       | 26       | 2        |
| 16-Aug-89 | 0               | 38        | 1      | 0    | 0       | 39       | 1        |
| 17-Aug-89 | 0               | 40        | 0      | 0    | 0       | 40       | 0        |
| 18-Aug-89 | 0               | 71        | 0      | 0    | 0       | 71       | 0        |
| 19-Aug-89 | 0               | 38        | 0      | 0    | 0       | 38       | 0        |
| 20-Aug-89 | 0               | 14        | 1      | 0    | 0       | 15       | 1        |
| 21-Aug-89 | 0               | 16        | 0      | 0    | 0       | 16       | 0        |
| 22-Aug-89 | 0               | 44        | 1      | 0    | 0       | 45       | 1        |
| 23-Aug-89 | 0               | 108       | 0      | 0    | 0       | 108      | 0        |
| 24-Aug-89 | 0               | 56        | 0      | 0    | 0       | 56       | 0        |
| 25-Aug-89 | 0               | 64        | 1      | 0    | 0       | 65       | 1        |
| 26-Aug-89 | 0               | 39        | 0      | 0    | 0       | 39       | 0        |
| 27-Aug-89 | 0               | 35        | 1      | 0    | 0       | 36       | 1        |
| 28-Aug-89 | 0               | 8         | 0      | 0    | 0       | 8        | 0        |
| 29-Aug-89 | 0               | 42        | 0      | 0    | 0       | 42       | 0        |
| 30-Aug-89 | 0               | 41        | 1      | 0    | 0       | 42       | 1        |
| 31-Aug-89 | 0               | 40        | 0      | 0    | 0       | 40       | 0        |
| Totals:   | 0               | 2433      | 14     | 0    | 13      | 2460     | 27       |

Appendix A-6. Monthly summary of the Rock Island Dam bypass trap catch,  
1 April -31 August, 1989.

| Month          | CHINOOK<br>YEARLING | CHINOOK<br>SUB-YEAR. | STLHD.        | COHO          | SOCKEYE       | TOTAL<br>SALMONID | TOTAL<br>YEARLING |
|----------------|---------------------|----------------------|---------------|---------------|---------------|-------------------|-------------------|
| <b>April</b>   | 4,042               | <b>1,449</b>         | 840           | 97            | 15,863        | 22,291            | 20,842            |
| May            | 6,056               | 4,905                | 18,967        | 23,162        | 3,493         | 56,583            | 51,678            |
| June           | 151                 | 10,417               | 5,066         | 1,299         | 358           | 17,291            | 6,874             |
| July           | 3                   | 17,262               | <b>117</b>    | <b>0</b>      | 85            | 17,467            | 205               |
| August         | <b>0</b>            | 2,433                | 14            | <b>0</b>      | 13            | 2,460             | 27                |
| <b>Totals:</b> | <b>10,252</b>       | <b>36,466</b>        | <b>25,004</b> | <b>24,558</b> | <b>19,812</b> | <b>116,092</b>    | <b>79,626</b>     |

## **Appendix B**

**Expanded Rock Island Dam bypass trap counts, 1 April -31 August**

# Appendix B-1. Expanded Rock Island Dam bypass trap counts, April, 1989.

| DATE       | CHINOOK<br>YEARLING | CHINOOK<br>SUB-YEAR. | STLHD. | COHO | SOCKEYE | TOTAL<br>SALMONID | TOTAL<br>YEARLING |
|------------|---------------------|----------------------|--------|------|---------|-------------------|-------------------|
| 01 -Apr-89 | 11                  | 13                   | 0      | 1    | 0       | 25                | 12                |
| 02-Apr-89  | 4                   | 75                   | 0      | 0    | 1       | 80                | 5                 |
| 03-Apr-89  | 2                   | 24                   | 0      | 0    | 2       | 28                | 4                 |
| 04-Apr-89  | 9                   | 37                   | 0      | 0    | 5       | 51                | 14                |
| 05-Apr-89  | 8                   | 26                   | 2      | 0    | 3       | 39                | 13                |
| 06-Apr-89  | 0                   | 37                   | 2      | 0    | 4       | 43                | 6                 |
| 07-Apr-89  | 4                   | 87                   | 4      | 0    | 40      | 135               | 48                |
| 08-Apr-89  | 23                  | 97                   | 4      | 0    | 114     | 238               | 141               |
| 09-Apr-89  | 24                  | 115                  | 22     | 0    | 342     | 503               | 388               |
| 10-Apr-89  | 13                  | 59                   | 15     | 0    | 42      | 129               | 70                |
| 11-Apr-89  | 70                  | 73                   | 26     | 0    | 322     | 491               | 418               |
| 12-Apr-89  | 103                 | 73                   | 26     | 0    | 198     | 400               | 327               |
| 13-Apr-89  | 80                  | 176                  | 55     | 0    | 65      | 376               | 200               |
| 14-Apr-89  | 66                  | 99                   | 44     | 0    | 185     | 394               | 295               |
| 15-Apr-89  | 299                 | 89                   | 44     | 0    | 625     | 1057              | 968               |
| 16-Apr-89  | 171                 | 137                  | 64     | 0    | 3050    | 3422              | 3285              |
| 17-Apr-89  | 97                  | 88                   | 78     |      | 3518    | 3782              | 3694              |
| 18-Apr-89  | 95                  | 83                   | 90     | 0    | 2763    | 3031              | 2948              |
| 19-Apr-89  | 52                  | 54                   | 41     | 0    | 560     | 707               | 653               |
| 20-Apr-89  | 83                  | 59                   | 37     | 0    | 246     | 425               | 366               |
| 21 -Apr-89 | 816                 | 25                   | 35     | 0    | 900     | 1776              | 1751              |
| 22-Apr-89  | 615                 | 13                   | 25     | 0    | 1363    | 2016              | 2003              |
| 23-Apr-89  | 325                 | 31                   | 15     | 0    | 1684    | 2055              | 2024              |
| 24-Apr-89  | 218                 | 27                   | 45     | 0    | 1235    | 1525              | 1498              |
| 25-Apr-89  | 420                 | 41                   | 39     | 0    | 563     | 1063              | 1022              |
| 26-Apr-89  | 328                 | 33                   | 68     | 0    | 219     | 648               | 615               |
| 27-Apr-89  | 307                 | 36                   | 95     | 0    | 193     | 631               | 595               |
| 28-Apr-89  | 293                 | 28                   | 87     | 3    | 238     | 649               | 621               |
| 29-Apr-89  | 492                 | 14                   | 88     | 62   | 187     | 1843              | 1829              |
| 30-Apr-89  | 619                 | 42                   | 101    | 86   | 665     | 1513              | 1471              |
| Totals:    | 5647                | 1791                 | 1152   | 153  | 20332   | 29075             | 27284             |

## Appendix B-2. Expanded Rock island Dam bypass trap counts, May, 1989.

| DATE           | CHINOOK<br>YEARLING | CHINOOK<br>SUB-YEAR. | STLHD. | COHO  | SOCKEYE | TOTAL<br>SALMONID | TOTAL<br>YEARLING |
|----------------|---------------------|----------------------|--------|-------|---------|-------------------|-------------------|
| 01-May-89      | 560                 | 32                   | 116    | 52    | 552     | 1312              | 1280              |
| 02-May-89      | 627                 | 21                   | 208    | 152   | 503     | 1511              | 1490              |
| 03-May-89      | 552                 | 39                   | 215    | 90    | 635     | 1531              | 1492              |
| 04-May-89      | 470                 | 65                   | 238    | 93    | 357     | 1223              | 1158              |
| 05-May-89      | 794                 | 1624                 | 354    | 49    | 73      | 2894              | 1270              |
| 06-May-89      | 668                 | 480                  | 442    | 64    | 77      | 1731              | 1251              |
| 07-May-89      | 462                 | 50                   | 445    | 31    | 31      | 1019              | 969               |
| 08-May-89      | 220                 | 76                   | 530    | 125   | 78      | 1029              | 953               |
| 09-May-89      | 393                 | 110                  | 869    | 236   | 430     | 2038              | 1928              |
| 10-May-89      | 482                 | 278                  | 844    | 545   | 228     | 2377              | 2099              |
| 11-May-89      | 370                 | 310                  | 1479   | 520   | 221     | 2900              | 2590              |
| 12-May-89      | 440                 | 246                  | 1986   | 406   | 214     | 3292              | 3046              |
| 13-May-89      | 301                 | 140                  | 1293   | 380   | 230     | 2344              | 2204              |
| 14-May-89      | 330                 | 167                  | 2066   | 692   | 137     | 3392              | 3225              |
| 15-May-89      | 318                 | 239                  | 2400   | 1131  | 340     | 4428              | 4189              |
| 16-May-89      | 342                 | 388                  | 3229   | 1606  | 388     | 5953              | 5565              |
| 17-May-89      | 348                 | 360                  | 2807   | 1935  | 215     | 5665              | 5305              |
| 18-May-89      | 314                 | 308                  | 2235   | 2032  | 205     | 5094              | 4786              |
| 19-May-89      | 282                 | 303                  | 1843   | 2040  | 105     | 4573              | 4270              |
| 20-May-89      | 224                 | 357                  | 1276   | 2926  | 135     | 4918              | 4561              |
| 21-May-89      | 173                 | 262                  | 1025   | 2475  | 72      | 4007              | 3745              |
| 22-May-89      | 214                 | 361                  | 839    | 3952  | 57      | 5423              | 5062              |
| 23-May-89      | 141                 | 222                  | 562    | 2632  | 62      | 3619              | 3397              |
| 24-May-89      | 115                 | 170                  | 582    | 3187  | 51      | 4105              | 3935              |
| 25-May-89      | 113                 | 142                  | 440    | 2195  | 36      | 2926              | 2784              |
| 26-May-89      | 69                  | 170                  | 352    | 1619  | 28      | 2238              | 2068              |
| 27-May-89      | 160                 | 116                  | 488    | 1527  | 14      | 2305              | 2189              |
| 28-May-89      | 101                 | 254                  | 428    | 778   | 9       | 1570              | 1316              |
| 29-May-89      | 27                  | 84                   | 247    | 898   | 22      | 1278              | 1194              |
| 30-May-89      | 19                  | 123                  | 254    | 874   | 25      | 1295              | 1172              |
| 31-May-89      | 17                  | 250                  | 270    | 628   | 20      | 1185              | 935               |
| <b>Totals:</b> | 9646                | 7747                 | 30362  | 35870 | 5550    | 89175             | 81428             |

Appendix B-3. Expanded Rock Island Dam bypass trap counts, June, 1989.

| DATE      | CHINOOK<br>YEARLING | CHINOOK<br>SUB-YEAR. | STLHD. | COHO      | SOCKEYE | TOTAL<br>SALMONID | TOTAL<br>YEARLING |
|-----------|---------------------|----------------------|--------|-----------|---------|-------------------|-------------------|
| 01-Jun-89 | 19                  | 644                  | 284    | 580       | 24      | 1551              | <b>907</b>        |
| 02-Jun-89 | 21                  | 877                  | 298    | 355       | 45      | 1596              | <b>719</b>        |
| 03-Jun-89 | 55                  | 687                  | 782    | 342       | 86      | <b>1952</b>       | <b>1265</b>       |
| 04-Jun-89 | 33                  | 662                  | 825    | 214       | 61      | 1795              | <b>1133</b>       |
| 05-Jun-89 | 10                  | 703                  | 885    | 113       | 29      | 1740              | <b>1037</b>       |
| 06-Jun-89 | 10                  | 751                  | 740    | 59        | 24      | 1584              | <b>833</b>        |
| 07-Jun-89 | 7                   | 898                  | 441    | 46        | 22      | 1414              | <b>516</b>        |
| 08-Jun-89 | 4                   | 915                  | 402    | 27        | 25      | 1373              | <b>458</b>        |
| 09-Jun-89 | 4                   | 1095                 | 421    | 18        | 45      | 1583              | <b>488</b>        |
| 10-Jun-89 | 14                  | 592                  | 381    | 6         | 14      | 1007              | <b>415</b>        |
| 11-Jun-89 | 9                   | 707                  | 265    | <b>14</b> | 27      | 1022              | <b>315</b>        |
| 12-Jun-89 | 3                   | 597                  | 121    | 3         | 14      | 738               | <b>141</b>        |
| 13-Jun-89 | 3                   | 383                  | 159    | 10        | 11      | 566               | <b>183</b>        |
| 14-Jun-89 | <b>1</b>            | 462                  | 177    | 7         | 12      | 659               | <b>197</b>        |
| 15-Jun-89 | 3                   | 330                  | 147    | 6         | 4       | 490               | 160               |
| 16-Jun-89 | 0                   | 214                  | 123    | 4         | 0       | <b>341</b>        | 127               |
| 17-Jun-89 | 2                   | 133                  | 42     | 4         | 3       | 184               | 51                |
| 18-Jun-89 | 2                   | 130                  | 13     | <b>1</b>  | 3       | 149               | 19                |
| 19-Jun-89 | 0                   | 111                  | 10     | 0         | 1       | 122               | <b>11</b>         |
| 20-Jun-89 | 2                   | 266                  | 53     | 0         | 5       | 326               | 60                |
| 21-Jun-89 | <b>1</b>            | 237                  | 25     | 0         | 7       | 270               | 33                |
| 22-Jun-89 | 2                   | 188                  | 12     | 0         | 2       | 204               | 16                |
| 23-Jun-89 | 0                   | 198                  | 28     | 0         | 1       | 227               | 29                |
| 24-Jun-89 | 1                   | 165                  | 30     | 0         | 2       | 198               | 33                |
| 25-Jun-89 | 0                   | 201                  | 25     | 0         | 4       | 230               | 29                |
| 26-Jun-89 | 0                   | 268                  | 24     | 0         | 4       | 296               | 28                |
| 27-Jun-89 | 0                   | 320                  | 35     | 0         | 2       | 357               | 37                |
| 28-Jun-89 | 0                   | <b>199</b>           | 28     | 1         | 2       | 230               | 31                |
| 29-Jun-89 | 0                   | 201                  | 19     | 0         | 2       | 222               | 21                |
| 30-Jun-89 | 0                   | 194                  | 10     | 0         | 1       | 205               | <b>11</b>         |
| Totals:   | 206                 | 13328                | 6805   | 1810      | 482     | 22631             | 9303              |

Appendix B-4. Expanded Rock Island Dam bypass trap counts, July, 1989.

| DATE      | CHINOOK<br>YEARLING | CHINOOK<br>SUB-YEAR. | STLHD. | COHO | SOCKEYE | TOTAL<br>SALMONID | TOTAL<br>YEARLING |
|-----------|---------------------|----------------------|--------|------|---------|-------------------|-------------------|
| 01-Jul-89 | 0                   | 457                  | 7      | 0    | 5       | 469               | 12                |
| 02-Jul-89 | 0                   | 914                  | 6      | 0    | 5       | 925               | 11                |
| 03-Jul-89 | 0                   | 711                  | 6      | 0    | 1       | 718               | 7                 |
| 04-Jul-89 | 0                   | 1164                 | 5      | 0    | 4       | 1173              | 9                 |
| 05-Jul-89 | 0                   | 1272                 | 5      | 0    | 13      | 1290              | 18                |
| 06-Jul-89 | 1                   | 2399                 | 8      | 0    | 11      | 2419              | 20                |
| 07-Jul-89 | 0                   | 1441                 | 15     | 0    | 8       | 1464              | 23                |
| 08-Jul-89 | 0                   | 818                  | 7      | 0    | 8       | 833               | 15                |
| 09-Jul-89 | 1                   | 811                  | 7      | 0    | 2       | 821               | 10                |
| 10-Jul-89 | 0                   | 346                  | 5      | 0    | 0       | 351               | 5                 |
| 11-Jul-89 | 0                   | 624                  | 12     | 0    | 1       | 637               | 13                |
| 12-Jul-89 | 0                   | 647                  | 11     | 0    | 3       | 661               | 14                |
| 13-Jul-89 | 0                   | 680                  | 6      | 0    | 6       | 692               | 12                |
| 14-Jul-89 | 0                   | 752                  | 5      | 0    | 9       | 766               | 14                |
| 15-Jul-89 | 0                   | 311                  | 4      | 0    | 2       | 317               | 6                 |
| 16-Jul-89 | 0                   | 213                  | 3      | 0    | 1       | 217               | 4                 |
| 17-Jul-89 | 0                   | 196                  | 0      | 0    | 0       | 196               | 0                 |
| 18-Jul-89 | 0                   | 364                  | 2      | 0    | 2       | 368               | 4                 |
| 19-Jul-89 | 0                   | 435                  | 2      | 0    | 2       | 439               | 4                 |
| 20-Jul-89 | 0                   | 687                  | 0      | 0    | 4       | 691               | 4                 |
| 21-Jul-89 | 0                   | 216                  | 0      | 0    | 1       | 217               | 1                 |
| 22-Jul-89 | 0                   | 284                  | 0      | 0    | 1       | 285               | 1                 |
| 23-Jul-89 | 1                   | 154                  | 1      | 0    | 0       | 156               | 2                 |
| 24-Jul-89 | 0                   | 231                  | 1      | 0    | 0       | 232               | 1                 |
| 25-Jul-89 | 0                   | 378                  | 0      | 0    | 0       | 378               | 0                 |
| 26-Jul-89 | 0                   | 531                  | 1      | 0    | 0       | 532               | 1                 |
| 27-Jul-89 | 0                   | 476                  | 0      | 0    | 1       | 477               | 1                 |
| 28-Jul-89 | 0                   | 250                  | 1      | 0    | 0       | 251               | 1                 |
| 29-Jul-89 | 0                   | 304                  | 2      | 0    | 0       | 306               | 2                 |
| 30-Jul-89 | 0                   | 288                  | 2      | 0    | 0       | 290               | 2                 |
| 31-Jul-89 | 0                   | 231                  | 0      | 0    | 0       | 231               | 0                 |
| Totals:   | 3                   | 18585                | 124    | 0    | 90      | 18802             | 217               |



Appendix B-5. Expanded Rock Island Dam bypass trap counts, August, 1989.

| DATE      | CHINOOK<br>YEARLING | CHINOOK<br>SUB-YEAR. | STLHD. | COHO | SOCKEYE | TOTAL<br>SALMONID | TOTAL<br>YEARLING |
|-----------|---------------------|----------------------|--------|------|---------|-------------------|-------------------|
| 01-Aug-89 | 0                   | 316                  | 0      | 0    | 1       | 317               | 1                 |
| 02-Aug-89 | 0                   | 225                  | 0      | 0    | 1       | 226               | 1                 |
| 03-Aug-89 | 0                   | 152                  | 0      | 0    | 0       | 152               | 0                 |
| 04-Aug-89 | 0                   | 191                  | 2      | 0    | 4       | 197               | 6                 |
| 05-Aug-89 | 0                   | 243                  | 0      | 0    | 1       | 244               | 1                 |
| 06-Aug-89 | 0                   | 183                  | 0      | 0    | 2       | 185               | 2                 |
| 07-Aug-89 | 0                   | 89                   | 2      | 0    | 0       | 91                | 2                 |
| 08-Aug-89 | 0                   | 163                  | 1      | 0    | 3       | 167               | 4                 |
| 09-Aug-89 | 0                   | 123                  | 0      | 0    | 0       | 123               | 0                 |
| 10-Aug-89 | 0                   | 98                   | 2      | 0    | 0       | 100               | 2                 |
| 11-Aug-89 | 0                   | 58                   | 0      | 0    | 0       | 58                | 0                 |
| 12-Aug-89 | 0                   | 31                   | 0      | 0    | 1       | 32                | 1                 |
| 13-Aug-89 | 0                   | 43                   | 1      | 0    | 0       | 44                | 1                 |
| 14-Aug-89 | 0                   | 56                   | 0      | 0    | 0       | 56                | 0                 |
| 15-Aug-89 | 0                   | 25                   | 0      | 0    | 2       | 27                | 2                 |
| 16-Aug-89 | 0                   | 42                   | 1      | 0    | 0       | 43                | 1                 |
| 17-Aug-89 | 0                   | 43                   | 0      | 0    | 0       | 43                | 0                 |
| 18-Aug-89 | 0                   | 77                   | 0      | 0    | 0       | 77                | 0                 |
| 19-Aug-89 | 0                   | 40                   | 0      | 0    | 0       | 40                | 0                 |
| 20-Aug-89 | 0                   | 16                   | 1      | 0    | 0       | 17                | 1                 |
| 21-Aug-89 | 0                   | 17                   | 0      | 0    | 0       | 17                | 0                 |
| 22-Aug-89 | 0                   | 47                   | 1      | 0    | 0       | 49                | 1                 |
| 23-Aug-89 | 0                   | 116                  | 0      | 0    | 0       | 116               | 0                 |
| 24-Aug-89 | 0                   | 60                   | 0      | 0    | 0       | 60                | 0                 |
| 25-Aug-89 | 0                   | 68                   | 1      | 0    | 0       | 69                | 1                 |
| 26-Aug-89 | 0                   | 43                   | 0      | 0    | 0       | 43                | 0                 |
| 27-Aug-89 | 0                   | 38                   | 1      | 0    | 0       | 39                | 1                 |
| 28-Aug-89 | 0                   | 9                    | 0      | 0    | 0       | 9                 | 0                 |
| 29-Aug-89 | 0                   | 48                   | 0      | 0    | 0       | 48                | 0                 |
| 30-Aug-89 | 0                   | 44                   | 1      | 0    | 0       | 45                | 1                 |
| 31-Aug-89 | 0                   | 43                   | 0      | 0    | 0       | 43                | 0                 |
| Totals:   | 0                   | 2748                 | 14     | 0    | 15      | 2777              | 29                |

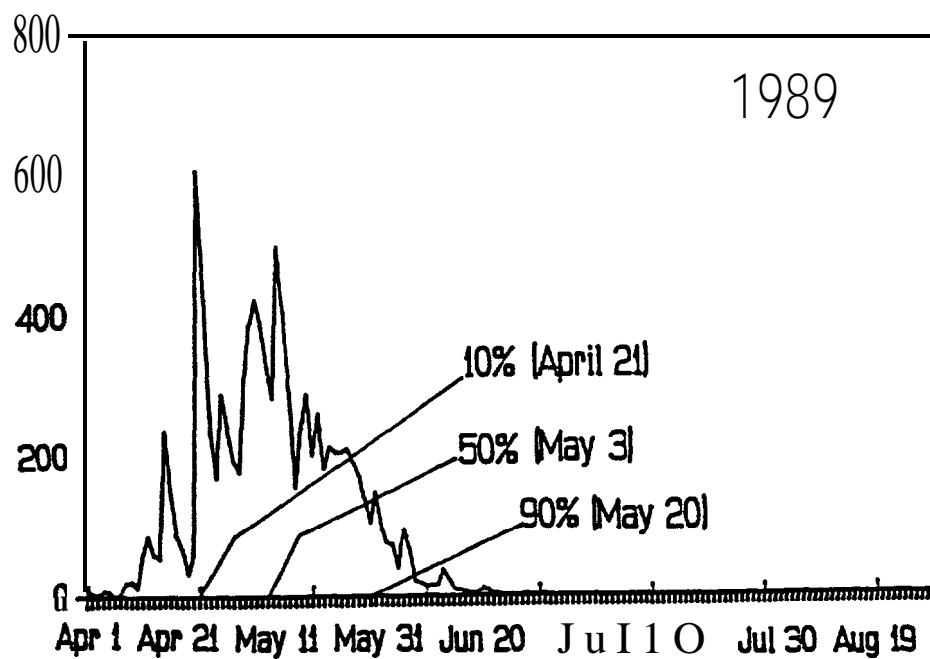
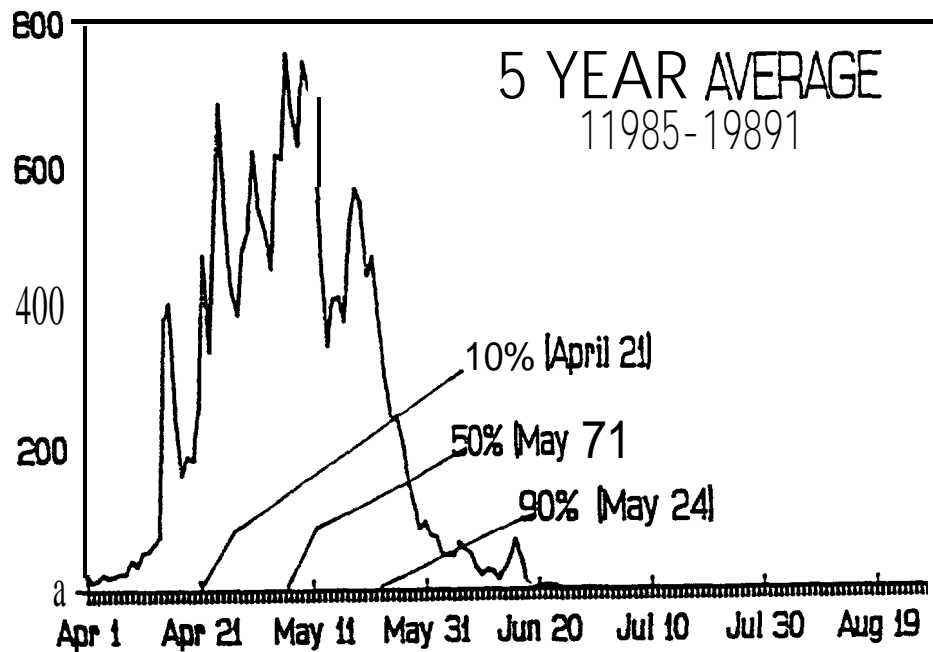
Appendix B-6. Monthly summary of the expanded counts from the Rock Island Dam bypass trap, 1 April -31 August.

| Month   | CHINOOK<br>YEARLING | CHINOOK<br>SUB-YEAR. | STLHD.        | COHO          | SOCKEYE      | TOTAL<br>SALMONID | TOTAL<br>YEARLING |
|---------|---------------------|----------------------|---------------|---------------|--------------|-------------------|-------------------|
| April   | 5,647               | 1,791                | 1,1s2         | 153           | 20,332       | 29,075            | 27,284            |
| May     | <b>9,646</b>        | <b>7,747</b>         | <b>30,362</b> | <b>35,870</b> | <b>5,550</b> | <b>89,175</b>     | <b>81,428</b>     |
| June    | <b>206</b>          | <b>13,328</b>        | <b>6,805</b>  | 1,810         | 482          | 22,631            | 9,303             |
| July    | 3                   | 18,585               | 124           | <b>0</b>      | <b>90</b>    | <b>18,802</b>     | <b>217</b>        |
| August  | <b>o</b>            | 2,747                | 14            | 0             | 15           | 2,777             | 29                |
| Totals: | 15,502              | <b>44,198</b>        | 38,457        | 37,833        | 26,469       | 162,460           | 118,261           |

## **Appendix C**

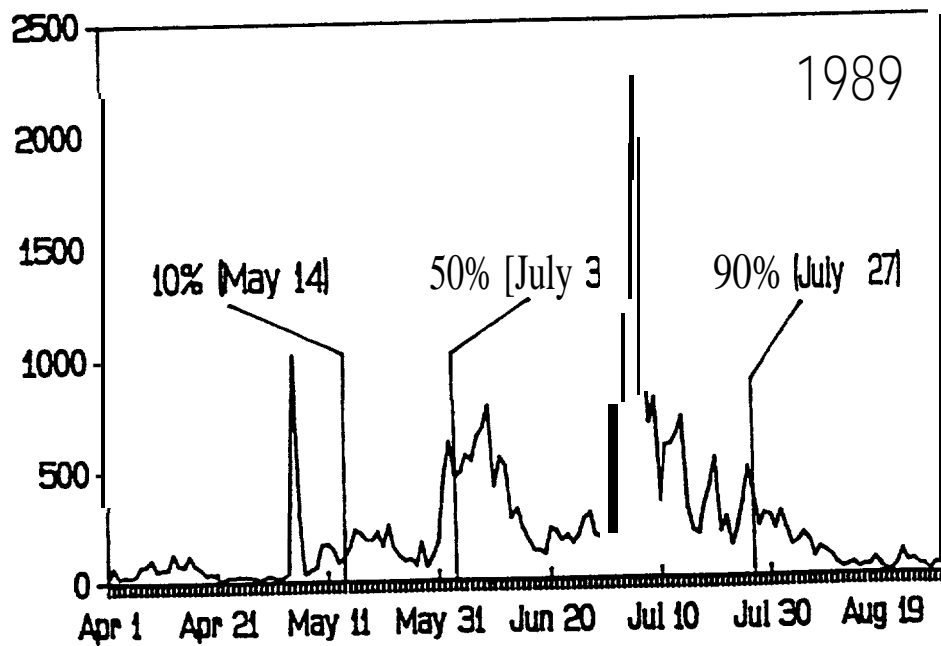
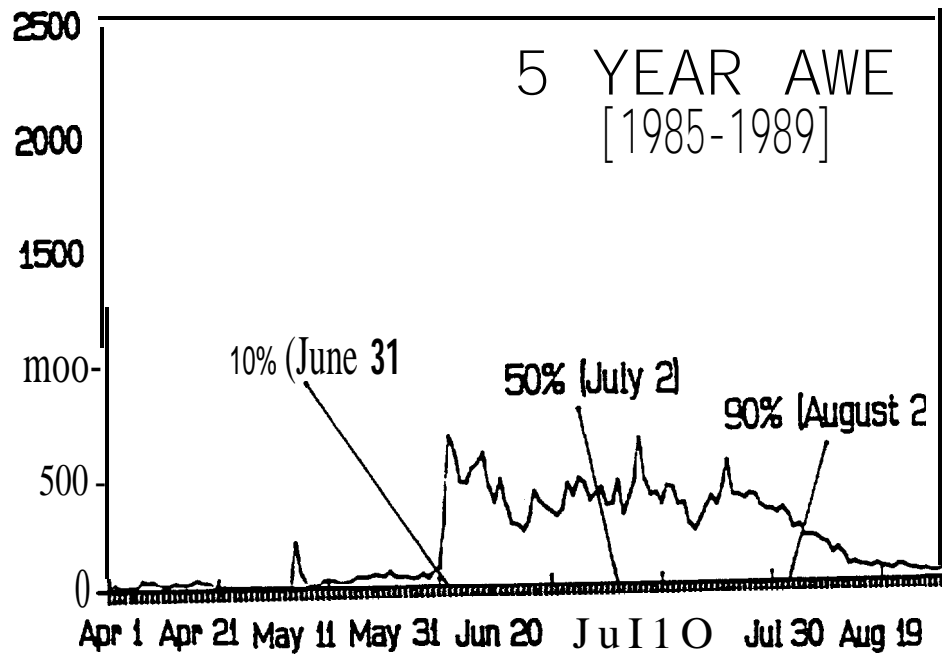
### **Daily juvenile salmonid run timing for 1989 and the 5 year average**

NUMBERS OF FISH PER DAY



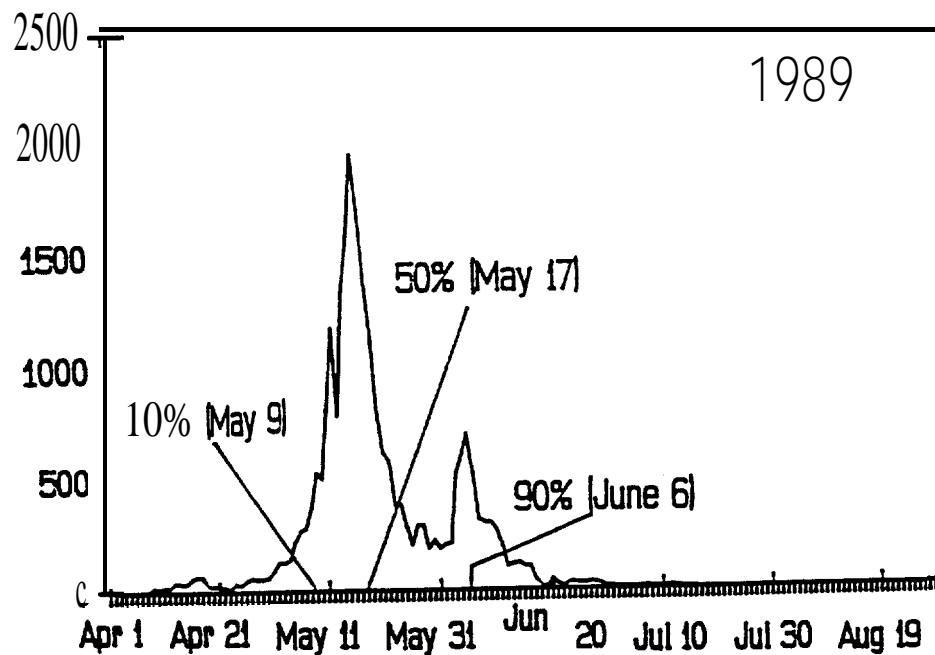
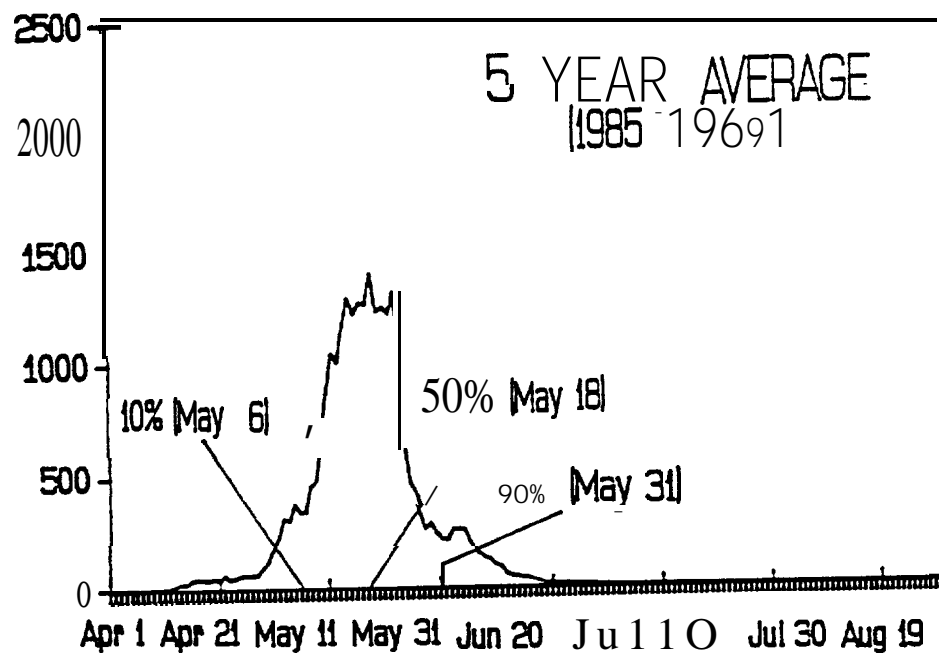
Appendix C-1. Chinook yearling juvenile run timing, Rock Island Dam, 1989 and the 5 year average.

# NUMBERS OF FISH PER DAY



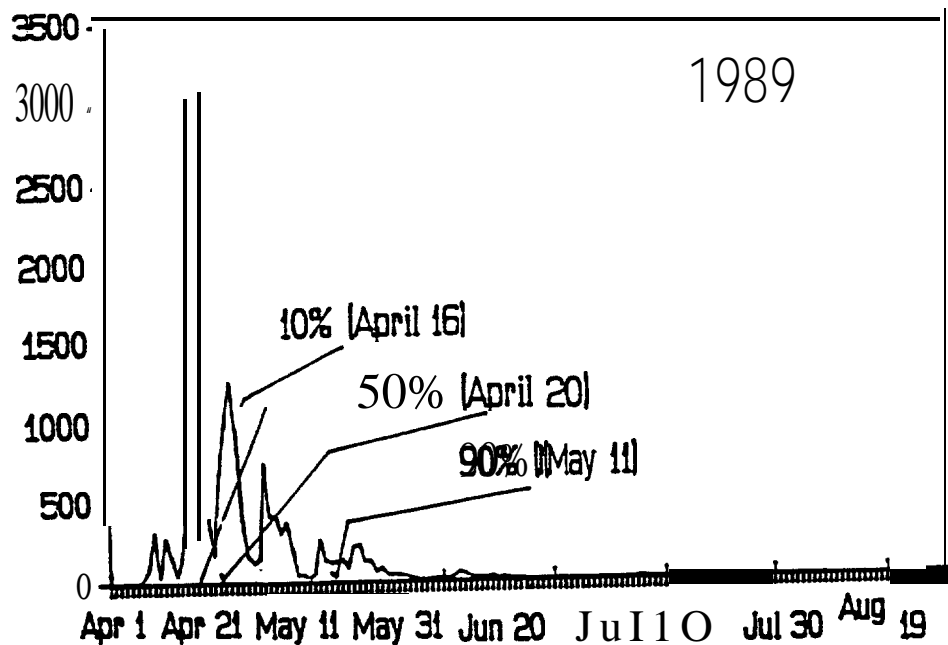
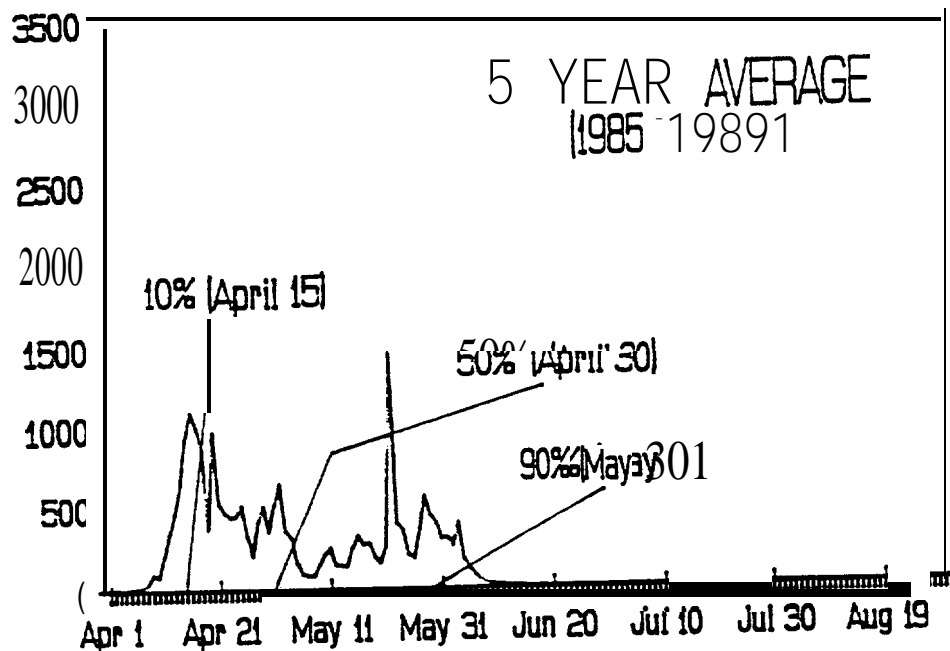
Appendix C-2. Chinook sub-yearling juvenile run timing, Rock Island Dam, 1989 and the 5 year average.

# NUMBERS OF FISH PER DAY



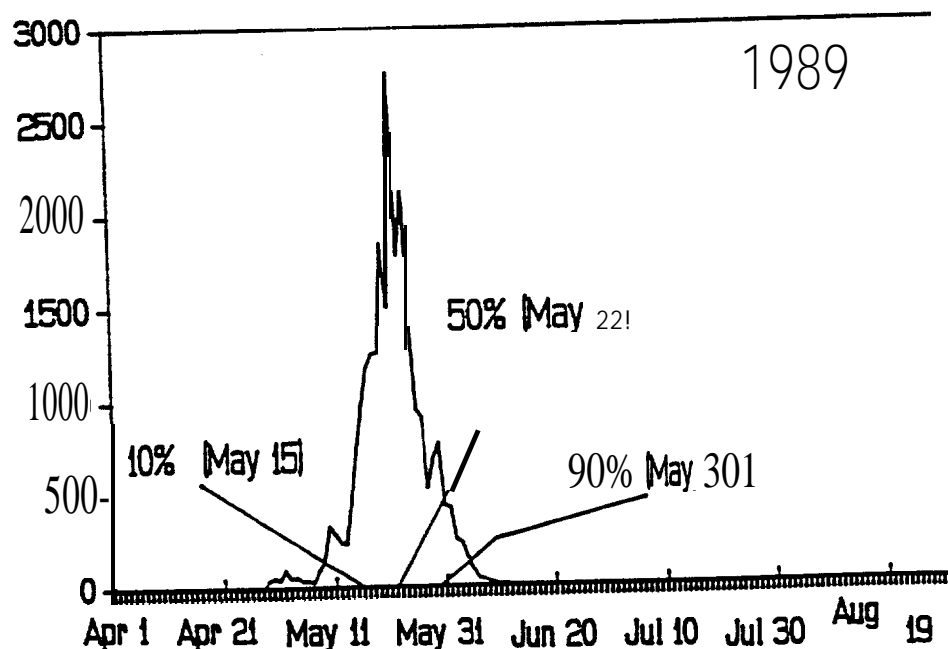
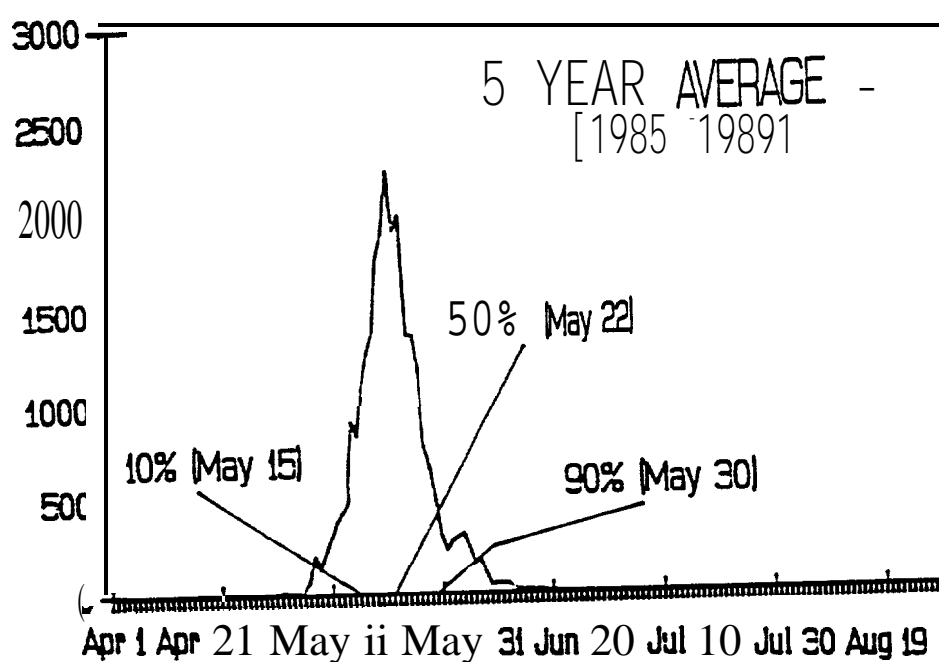
Appendix C-3. Steelhead juvenile run timing, Rock Island Dam, 1989 and the 5 year average.

NUMBERS OF FISH PER DAY



Appendix C-5. Sockeye juvenile run timing, Rock Island Dam, 1989 and the 5 year average.

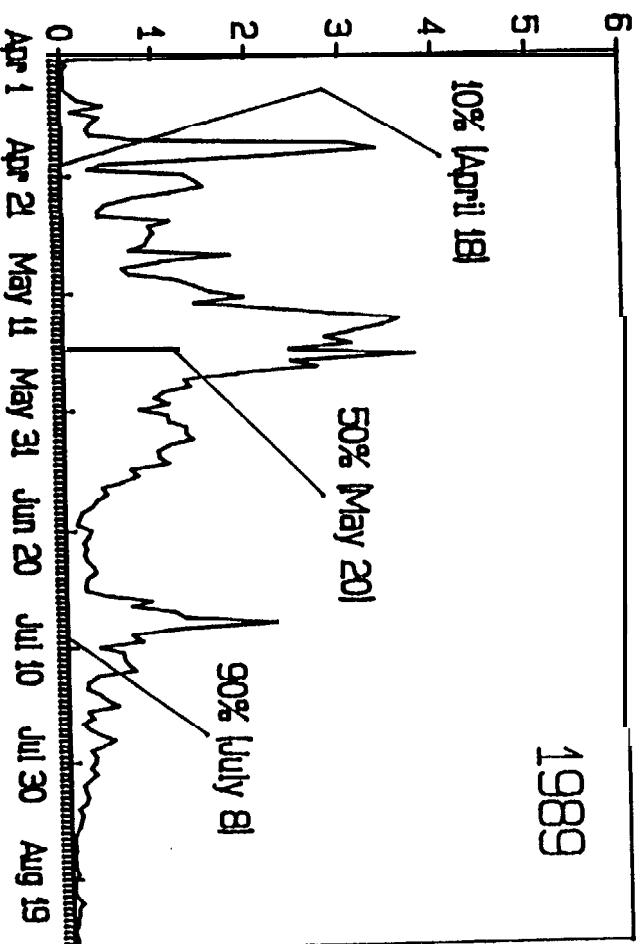
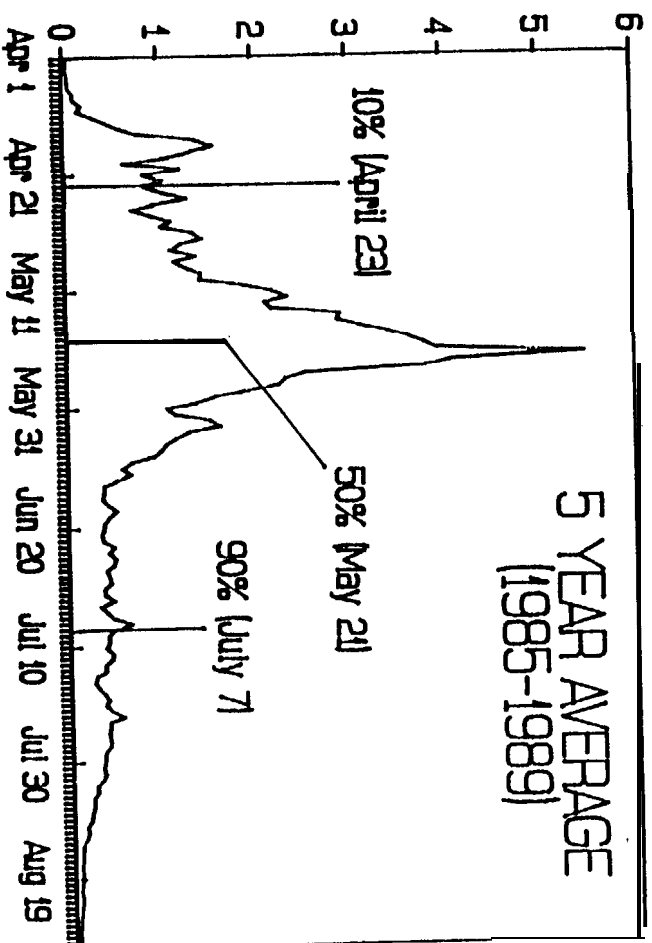
NUMBERS OF FISH PER DAY



Appendix C-4. Coho juvenile run timing, Rock Island Dam, 1989 and the 5 year average.

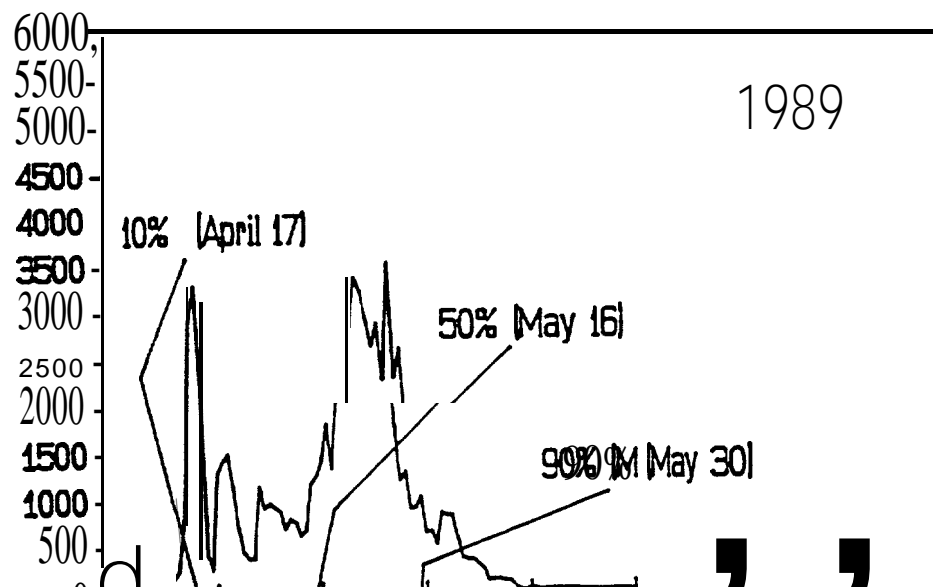
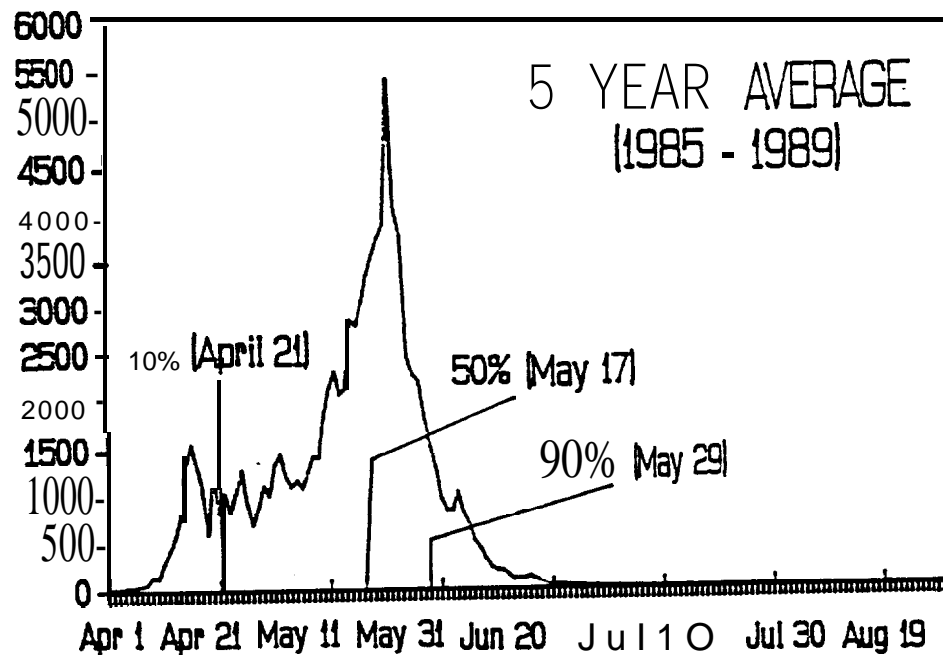


# NUMBERS OF FISH PER DAY (THOUSANDS)



Appendix C-6. Total juvenile run timing, Rock Island Dam, 1989 and the 5 year average.

# NUMBERS OF FISH PER DAY



## **Appendix D**

**Daily summary of branded chinook and steelhead sampled from the  
Rock Island Dam bypass, 1 April -31 August**

Appendix D-1. Daily summary of branded chinook and steelhead sampled from the Rock Island Dam

| Chinook Brad |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
|--------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|-------|---------|
| Date         | LA/7C/1 | LA/7C/3 | RD/7C/1 | RA/7T/1 | RA/7T/3 | LD/7N/1 | RA/7N/1 | RA/7N/3 | LA/1R/1 | LA/1R/3 | RA/1R/1 | RA/1R/3 | RA/7T/1 | RA/7T/3 | Ad Clips |       | RD/7F/1 |
|              |         |         |         |         |         |         |         |         |         |         |         |         |         |         | Subyr    | Yrlng |         |
| 04/01/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/02/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/03/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/04/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/05/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/06/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/07/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/08/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/09/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/10/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/11/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/12/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/13/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/14/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/15/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/16/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/17/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/18/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/19/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/20/89     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |       |         |
| 04/21/89     | 5       | 7       |         | 5       |         |         |         |         |         |         |         |         |         |         |          |       | 34      |
| 04/22/89     | 3       |         |         | 2       |         | 1       |         |         |         |         |         |         |         |         |          |       | 18      |
| 04/23/89     | 2       | 1       |         | 1       | 3       | 1       |         |         |         |         |         |         |         |         |          |       | 15      |
| 04/24/89     | 1       |         |         |         | 3       | 5       |         |         |         |         |         |         |         |         |          |       | 6       |
| 04/25/89     | 6       | 1       |         | 3       | 2       | 3       |         |         |         |         |         |         |         |         |          |       | 12      |
| 04/26/89     | 1       |         |         | 3       |         |         |         |         |         |         |         |         |         |         |          |       | 3       |
| 04/27/89     |         | 1       |         |         | 4       |         |         |         |         |         |         |         |         |         |          |       | 2       |
| 04/28/89     |         |         |         |         | 2       | 2       | 1       |         |         |         |         |         |         |         |          |       | 23      |
| 04/29/89     |         |         |         |         | 2       |         |         |         |         |         |         |         |         |         |          |       | 36      |
| 04/30/89     |         | 1       |         |         | 2       | 2       | 1       |         |         |         |         |         |         |         |          |       | 45      |
| Totals:      | 18      | 11      |         | 14      | 14      | 3       | 1       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0        | 194   | 0       |

# Appendix D-2. Daily summary of branded chinook and steelhead sampled from the Rock Island Dam

| Date     | Chinook Brands |         |         |         |         |         |         |         |               |         |         |         |         |         | M Clips |       | RD/7F/1 |
|----------|----------------|---------|---------|---------|---------|---------|---------|---------|---------------|---------|---------|---------|---------|---------|---------|-------|---------|
|          | LA/7C/1        | LA/7C/3 | RD/7C/1 | RA/7T/1 | RA/7T/3 | LD/7N/1 | RA/7N/1 | RA/7N/3 | L A / I R / I | LA/IR/3 | RA/IR/1 | RA/IR/3 | RA/7I/1 | RA/7I/3 | Subyr   | Yrlnr |         |
|          |                |         |         |         |         |         |         |         |               |         |         |         |         |         |         |       |         |
| 05/01/89 |                | 3       | 1       | 2       |         |         | 1       |         | 1             |         |         |         |         |         |         | 52    |         |
| 05/02/89 | 1              | 1       |         |         |         | 3       |         |         |               |         |         |         |         |         |         | 39    |         |
| 05/03/89 |                |         | 1       |         |         |         |         | 1       |               |         |         |         |         |         |         | 44    |         |
| 05/04/89 | 2              | 2       |         | 1       |         |         |         | 1       |               |         |         | 1       |         |         | 25      | 43    | 1       |
| 05/05/89 |                | 5       |         | 2       | 2       | 2       | 2       | 2       | 21            | 20      | 24      | 15      |         |         | 993     | 118   |         |
| 05/06/89 | 2              | 2       | 2       | 1       |         |         |         |         | 2             | 14      | 10      | 5       | 3       |         | 271     | 19    |         |
| 05/07/89 | 1              | 1       |         |         |         |         |         |         | 1             | 2       | 4       | 3       | 3       |         | 25      | 37    |         |
| 05/08/89 | 1              |         | 1       |         |         |         |         |         | 1             | 7       | 3       | 2       |         |         | 49      | 32    |         |
| 05/09/89 | 2              | 1       | 1       |         |         |         | 1       |         | 3             | 6       |         | 8       |         |         | 32      | 37    | 1       |
| 03/10/89 |                | 1       |         |         |         |         | 1       |         | 2             | 4       | 5       | 5       | 2       |         | 97      | 58    |         |
| 05/11/89 | 1              |         |         |         |         |         |         |         | 2             | 4       | 5       | 3       | 3       |         | 49      | 45    | 9       |
| 05/12/89 |                |         |         |         |         | 1       |         | 1       | 10            | 8       | 8       | 1       |         |         | 74      | 83    | 32      |
| 05/13/89 | 1              | 2       |         | 1       | 1       |         |         |         | 1             | 4       | 9       | 3       | 4       |         | 58      | 39    | 6       |
| 05/14/89 |                | 2       | 1       |         |         |         | 1       | 1       | 1             | 9       | 4       | 2       | 10      |         | 55      | 52    | 33      |
| 05/15/89 | 1              | 2       | 1       |         |         | 1       |         | 1       | 2             | 7       | 6       | 7       | 2       |         | 101     | 51    | 26      |
| 05/16/89 |                | 1       |         |         |         |         |         | 1       | 1             | 8       | 7       | 7       | 3       |         | 171     | 46    | 24      |
| 05/17/89 |                | 2       |         |         |         |         |         | 1       | 2             | 8       | 9       | 4       | 4       |         | 198     | 52    | 19      |
| 05/18/89 | 1              |         | 1       | 1       |         |         | 1       | 2       |               | 8       | 3       | 2       | 6       |         | 133     | 37    | 6       |
| 05/19/89 | 1              |         | 1       |         |         |         |         | 2       | 1             | 4       | 6       | 6       | 6       |         | 168     | 17    | 8       |
| 05/20/89 | 2              |         | 1       | 1       |         |         |         |         |               | 3       | 3       | 2       |         |         | 184     | 28    | 7       |
| 05/21/89 |                |         |         |         |         |         |         |         | 1             | 1       | 1       |         | 1       |         | 135     | 6     | 6       |
| 05/22/89 | 1              | 2       | 1       |         |         |         |         |         | 1             | 1       | 1       | 1       |         |         | 227     | 20    | 2       |
| 05/23/89 |                |         |         |         |         |         |         | 2       | 1             | 3       | 3       |         |         |         | 111     | 8     | 7       |
| 05/24/89 |                |         |         |         |         |         |         |         | 1             |         | 1       |         |         |         | 94      | 4     | 2       |
| 05/25/89 |                | 1       |         |         |         |         | 1       | 1       |               |         |         |         |         |         | 50      | 9     | 1       |
| 05/26/89 |                |         |         |         |         |         | 1       |         | 1             |         | 1       | 1       |         |         | 56      | 6     |         |
| 05/27/89 |                |         |         |         |         |         |         |         | 1             | 1       |         |         | 1       | 3       | 48      | 11    | 2       |
| 05/28/89 |                |         |         |         |         |         |         |         |               |         |         | 2       | 5       | 4       | 122     | 14    | 1       |
| 05/29/89 |                |         |         |         |         |         |         |         |               | 1       |         | 1       | 3       | 4       | 21      | 2     | 2       |
| 05/30/89 |                |         |         |         |         |         |         |         |               |         |         | 1       | 6       | 9       | 40      | 2     |         |
| 05/31/89 |                |         |         |         |         |         |         |         | 1             |         | 1       | 3       | 5       | 9       | 39      | 3     | 1       |
| Totals:  | 17             | 28      | 13      | 9       | 8       | 8       | 17      | 22      | 124           | 119     | 88      | 82      | 20      | 29      | 3626    | 1133  | 196     |

Appendix D-3. Daily summary of branded chinook and steelhead sampled from the Rock Island Dam bypass, June, 1989.

| Chinook Brands |         |         |         |         |         |         |         |         |         |         |         |         |         |         | Steelhead Brands |       |         |         |         |         |         |     |
|----------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|------------------|-------|---------|---------|---------|---------|---------|-----|
| Date           | LA/7C/1 | LA/7C/3 | RD/7C/1 | RA/7T/1 | RA/7T/3 | LD/7N/1 | RA/7N/1 | RA/7N/3 | LA/1R/1 | LA/1R/3 | RA/1R/1 | RA/1R/3 | RA/7T/1 | RA/7T/3 | Ad Clips         |       | RD/7F/1 | RD/7F/3 | LA/7F/1 | LA/7F/3 | M Clips |     |
|                |         |         |         |         |         |         |         |         |         |         |         |         |         |         | Subyr            | YrIng |         |         |         |         |         |     |
| 06/01/89       |         |         |         |         |         |         |         |         |         |         |         |         | 12      | 11      | 151              | 2     |         | 2       |         |         |         | 121 |
| 06/02/89       |         |         |         |         |         |         |         |         |         |         |         |         | 8       | 2       | 154              | 2     |         |         |         |         |         | 145 |
| 06/03/89       |         |         |         |         |         |         |         |         |         |         |         |         | 9       | 7       | 57               | 8     |         |         |         |         |         | 4s5 |
| 06/04/89       |         |         |         |         |         |         |         |         |         |         |         |         | 11      | 4       | 73               |       |         |         |         |         |         | 527 |
| 06/05/89       |         |         |         |         |         |         |         |         |         |         |         |         | 4       | 10      | 51               |       |         |         | 1       |         |         | 626 |
| 06/06/89       |         |         |         |         |         |         |         |         |         |         |         |         | 4       | 7       | 74               |       |         |         |         |         |         | 432 |
| 06/07/89       |         |         |         |         |         |         |         |         |         |         |         |         | 5       | 8       | 60               |       |         | 5       |         |         |         | 253 |
| 06/08/89       |         |         |         |         |         |         |         |         |         |         |         |         | 14      | 13      | 64               |       |         |         |         |         |         | 251 |
| 06/09/89       |         |         |         |         |         |         |         |         |         |         |         |         | 16      | 12      | 3s               |       |         |         |         |         |         | 252 |
| 06/10/89       |         |         |         |         |         |         |         |         |         |         |         |         | 12      | 12      | 33               |       |         |         |         |         |         | 193 |
| 06/11/89       |         |         |         |         |         |         |         |         |         |         |         |         | 9       | 12      | 44               |       |         |         |         |         |         | 143 |
| 06/12/89       |         |         |         |         |         |         |         |         |         |         |         |         | 2       | 9       | 11               | 1     |         |         |         |         |         | 70  |
| 06/13/89       |         |         |         |         |         |         |         |         |         |         |         |         | 4       | 1       | 22               |       |         |         |         |         |         | 85  |
| 06/14/89       |         |         |         |         |         |         |         |         |         |         |         |         | 1       |         | 13               |       |         |         |         |         |         | 83  |
| 06/15/89       |         |         |         |         |         |         |         |         |         |         |         |         | 2       |         | 1s               |       |         |         |         |         |         | 77  |
| 06/16/89       |         |         |         |         |         |         |         |         |         |         |         |         |         | 1       | 5                |       |         |         |         |         |         | 61  |
| 06/17/89       |         |         |         |         |         |         |         |         |         |         |         |         |         |         | 11               |       |         |         |         |         |         | 27  |
| 06/18/89       |         |         |         |         |         |         |         |         |         |         |         |         |         |         | 1                |       |         |         |         |         |         | 5   |
| 06/19/89       |         |         |         |         |         |         |         |         |         |         |         |         |         | 1       | 4                |       |         |         |         |         |         | 6   |
| 06/20/89       |         |         |         |         |         |         |         |         |         |         |         |         | 1       |         | 12               |       |         |         |         |         |         | 30  |
| 06/21/89       |         |         |         |         |         |         |         |         |         |         |         |         |         | 2       | 1d               |       |         |         |         |         |         | 17  |
| 06/22/89       |         |         |         |         |         |         |         |         |         |         |         |         | 1       |         | 9                |       |         |         |         |         |         | 4   |
| 06/23/89       |         |         |         |         |         |         |         |         |         |         |         |         |         | 1       | 8                |       |         |         |         |         |         | 16  |
| 06/24/89       |         |         |         |         |         |         |         |         |         |         |         |         |         |         | 5                | 1     |         |         |         |         |         | 18  |
| 06/25/89       |         |         |         |         |         |         |         |         |         |         |         |         |         |         | 4                |       |         |         |         |         |         | 22  |
| W-26159        |         |         |         |         |         |         |         |         |         |         |         |         |         |         | 4                |       |         |         |         |         |         | 22  |
| 06/27/89       |         |         |         |         |         |         |         |         |         |         |         |         |         |         | 5                |       |         |         |         |         |         | 28  |
| 06/28/89       |         |         |         |         |         |         |         |         |         |         |         |         |         |         | 3                |       |         |         |         |         |         | 24  |
| 06/29/89       |         |         |         |         |         |         |         |         |         |         |         |         |         |         | 2                |       |         |         |         |         |         | 16  |
| 06/30/89       |         |         |         |         |         |         |         |         |         |         |         |         |         |         |                  |       |         |         |         |         |         | 6   |
|                |         |         |         |         |         |         |         |         |         |         |         |         |         |         | 113              | 944   |         |         |         |         |         |     |

Appendix D-4. Daily summary of branded chinook and steelhead sampled from the Rock island Dam bypass, July, 1989.

| Chinook Brands |         |         |         |         |         |         |         |         |   |   |   |   |   | Steelhead Brands |         |         |         |         |         |        |         |         |         |         |          |
|----------------|---------|---------|---------|---------|---------|---------|---------|---------|---|---|---|---|---|------------------|---------|---------|---------|---------|---------|--------|---------|---------|---------|---------|----------|
| Date           | LA/7C/1 | LA/7C/3 | RD/7C/1 | RA/7T/1 | RA/7T/3 | LD/7N/1 | RA/7N/1 | RA/7N/3 | L | A | I | R | I | LA/1R/3          | RA/1R/1 | RA/1R/3 | RA/7T/1 | RA/7T/3 | M Clips |        | RD/7F/1 | RD/7F/3 | LA/7F/1 | LA/7F/3 | Ad Clips |
|                |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         | Subyr   | Yr/ing |         |         |         |         |          |
| 07/01/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 2        |
| 07/02/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 4        |
| 07/03/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 3        |
| 07/04/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 4        |
| 07/05/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         | 1       |         |        |         |         |         |         | 2        |
| 07/06/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 6        |
| 07/07/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 11       |
| 07/08/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 5        |
| 07/09/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 6        |
| 07/10/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 3        |
| 07/11/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 9        |
| 07/12/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 8        |
| 07/13/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 5        |
| 07/14/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 3        |
| 07/15/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 4        |
| 07/16/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 3        |
| 07/17/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 0        |
| 07/18/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 1        |
| 07/19/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 1        |
| 07/20/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 0        |
| 07/21/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 0        |
| 07/22/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 0        |
| 07/23/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 1        |
| 07/24/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 1        |
| 07/25/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 0        |
| 07/26/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 1        |
| 07/27/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 0        |
| 07/28/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         | 1        |
| 07/29/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         |          |
| 07/30/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         |          |
| 07/31/89       |         |         |         |         |         |         |         |         |   |   |   |   |   |                  |         |         |         |         |         |        |         |         |         |         |          |
| Totals:        | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0 | 0 | 0 | 0 | 0 | 0                | 0       | 0       | 0       | 1       | 0       | 0      | 0       | 0       | 0       | 0       | 84       |

Appendix D-5. Daily summary of branded chinook and steelhead sampled from the Rock island Dam bypass, August, 1989.

| Date     | Chinook Brands |         |         |         |         |         |         |         |           |         |         |         |         |         | Steelhead Brands |       |         |         |         |         |          |
|----------|----------------|---------|---------|---------|---------|---------|---------|---------|-----------|---------|---------|---------|---------|---------|------------------|-------|---------|---------|---------|---------|----------|
|          |                |         |         |         |         |         |         |         |           |         |         |         |         |         | Ad Clips         |       |         |         |         |         |          |
|          | LA/7C/1        | LA/7C/3 | RD/7C/1 | RA/7T/1 | RA/7T/3 | LD/7N/1 | RA/7N/1 | RA/7N/3 | L.A./1R/1 | LA/1R/3 | RA/1R/1 | RA/1R/3 | RA/7T/1 | RA/7T/3 | Subyr            | Yring | RD/7F/1 | RD/7F/3 | LA/7F/1 | LA/7F/3 | Ad Clips |
| 08/01/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         | 2        |
| 08/02/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         | 1        |
| 08/03/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/04/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/05/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/06/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/07/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/08/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/09/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/10/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         | 2        |
| 08/11/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/12/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/13/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/14/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/15/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/16/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/17/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/18/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/19/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/20/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/21/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/22/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         | 1        |
| 08/23/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/24/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/25/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/26/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/27/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/28/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/29/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/30/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| 08/31/89 |                |         |         |         |         |         |         |         |           |         |         |         |         |         |                  |       |         |         |         |         |          |
| Totals:  | 0              | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0         | 0       | 0       | 0       | 0       | 0       | 0                | 0     | 0       | 0       | 0       | 0       | 7        |



**Appendix D-6. Monthly summary of branded chinook and steelhead sampled from the Rock Island Dam bypass trap, 1 April -31 August, 1989.**

| Month   | Chinook Brands |         |         |         |         |         |         |         |         |         |         |         |         |         | M Clips |       | Steelhead Brands |         |         |         | Ad clips |
|---------|----------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-------|------------------|---------|---------|---------|----------|
|         | LA/7C/1        | LA/7C/3 | RD/7C/1 | RA/7T/1 | RA/7T/3 | LD/7N/1 | RA/7N/1 | RA/7N/3 | LA/IR/1 | LA/IR/3 | RA/IR/1 | RA/IR/3 | RA/7T/1 | RA/7T/3 | Subyr   | Yring | RD/7F/1          | RD/7F/3 | LA/7F/1 | LA/7F/3 |          |
|         |                |         |         |         |         |         |         |         |         |         |         |         |         |         |         |       |                  |         |         |         |          |
| April   |                | 18 11   |         | 14      | 1s      | 14      | 3       | 1       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 194   | 0                | 0       | 0       | 0       | 260      |
| May     |                | 17 28   | 13      | 9       | s       | 8       | 17      | 22      | 124     | 119     | 88      | 82      | 20      | 29      | 3,626   | 1,133 | 196              | 200     | 65      | 66      | 16,119   |
| June    | 0              | 0       | 0       | 0       | 0       | 0       | 1       | 0       | n       | 0       | 0       | 0       | 115     | 113     | 944     | 16    | 7                | 2       | 1       | 1       | 4,015    |
| July    | 0              | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 1       | 0       | 0     | 0                | 0       | 0       | 0       | 84       |
| August  | 0              | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0     | 0                | 0       | 0       | 0       | 7        |
| Totals: | 35             | 39      | 27      | 17      | 22      | 11      | 19      | 22      | 124     | 119     | 88      | 82      | 135     | 143     | 4,570   | 1,343 | 203              | 202     | 66      | 67      | 20,485   |

## **Appendix E**

**Daily summary of branded accelerated growth chinook sub-yearlings  
captured at the Rock Island Dam bypass trap, 1 April -31 August**

Appendix E-1. Daily summary of branded accelerated *growth chinook* sub-yearlings captured at the Rock Island Dam bypass trap, April, 1989.

| Date     | LA/IH/1 | LA/IH/3 | RA/IH/1 | RA/IH/3 | LA/IJ/1 | LA/IJ/3 | RA/IJ/1 | RA/IJ/3 | RA/IK/ 1 | RA/IK/3 | LA/IL/1 | LA/IL/3 | RA/IL/1 | RA/IL/3 |
|----------|---------|---------|---------|---------|---------|---------|---------|---------|----------|---------|---------|---------|---------|---------|
| 04/01/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/02/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/03/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/04/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/05/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/06/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/07/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/08/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/09/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/10/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/11/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/12/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/13/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/14/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/15/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/16/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/17/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/18/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/19/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/20/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/21/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/22/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/23/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/24/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/25/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/26/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/27/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/28/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/29/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| 04/30/89 |         |         |         |         |         |         |         |         |          |         |         |         |         |         |
| Totals:  | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0        | 0       | 0       | 0       | 0       | 0       |

Appendix E-2. Daily summary of branded accelerated growth chinook sub-yearlings captured at the Rock Island Dam bypass trap, May, 1989.

| Date     | LA/IH/1 | LA/IH/3 | RA/IH/1 | RA/IH/3 | LA/IJ/1 | LA/IJ/3 | RA/IJ/1 | RA/IJ/3 | RA/IK/1 | RA/IK/3 | LA/IL/1 | LA/IL/3 | RA/IL/1 | RA/IL/3 |
|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 05/01/89 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 05/02/89 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 05/03/89 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 05/04/89 | 1       |         | 1       |         | 5       | 5       | 5       | 1       | 4       | 1       | 2       | 1       |         | 4       |
| 05/05/89 | 108     | 153     | 131     | 170     | 58      | 42      | 44      | 50      | 10      | 17      | 70      | 70      | 38      | 55      |
| 05/06/89 | 38      | 38      | 18      | 38      | 17      | 20      | 19      | 11      | 24      | 24      | 9       | 16      | 9       | 5       |
| 05/07/89 | 1       |         | 4       | 4       | 2       |         |         | 1       | 3       |         | 9       | 1       |         | 3       |
| 05/08/89 | 1       | 7       |         | 6       | 3       | 6       | 5       | 5       | 2       |         | 2       | 6       | 4       | 2       |
| 05/09/89 | 2       | 2       | 1       | 4       | 3       | 2       | 1       | 3       |         |         | 1       | 0       | 1       | 0       |
| 05/10/89 | 8       | 9       | 11      | 21      | 8       | 6       | 8       | 6       | 2       | 6       | 5       | 9       | 3       | 3       |
| 05/11/89 | 3       | 7       | 7       | 14      | 2       |         | 3       | 2       |         | 2       | 1       | 1       | 1       | 1       |
| 05/12/89 | 4       | 11      | 11      | 13      | 5       | 4       | 5       | 6       | 1       | 1       | 4       | 7       | 1       | 2       |
| 05/13/89 | 3       | 11      | 10      | 15      | 4       | 2       | 2       | 2       | 0       | 2       | 2       | 2       | 1       | 2       |
| 05/14/89 | 12      | 11      | 5       | 11      | 1       |         | 2       |         |         |         | 4       |         | 5       | 5       |
| 05/15/89 | 11      | 30      | 12      | 25      | 2       | 1       | 1       | 1       |         |         | 8       | 3       | 6       | 6       |
| 05/16/89 | 23      | 24      | 35      | 36      | 1       | 3       | 2       | 1       | 6       | 1       | 17      | 11      | 10      | 8       |
| 05/17/89 | 19      | 29      | 35      | 47      | 1       | 1       | 1       | 5       | 2       | 2       | 8       | 11      | 10      | 17      |
| 05/18/89 | 27      | 17      | 19      | 18      | 4       | 1       | 1       | 5       | 1       | 1       | 9       | 10      | 7       | 15      |
| 05/19/89 | 31      | 27      | 28      | 29      | 4       | 4       | 4       | 4       | 4       | 2       | 11      | 10      | 7       | 9       |
| 05/20/89 | 21      | 30      | 32      | 45      | 2       | 4       | 2       | 6       | 2       | 1       | 18      | 8       | 4       | 12      |
| 05/21/89 | 21      | 14      | 20      | 20      | 3       | 6       | 1       | 2       |         | 1       | 12      | 11      | 2       | 11      |
| 05/22/89 | 26      | 27      | 28      | 51      | 4       | 5       | 5       | 6       | 6       | 3       | 20      | 13      | 17      | 16      |
| 05/23/89 | 16      | 13      | 20      | 17      | 8       | 4       | 5       | 3       | 2       |         | 8       | 2       | 2       | 11      |
| 05/24/89 | 14      | 12      | 12      | 11      | 5       | 4       | 6       | 2       | 2       |         | 4       | 8       | 4       | 4       |
| 05/25/89 | 3       | 4       | 5       | 12      | 2       | 6       | 3       | 5       | 1       |         | 4       | 3       | 3       | 2       |
| 05/26/89 | 1       | 8       | 7       | 12      | 4       | 5       | 2       | 5       | 1       | 1       | 2       | 2       | 1       | 3       |
| 05/27/89 | 3       | 6       |         | 6       | 7       | 1       | 4       | 3       | 2       |         | 1       | 2       | 2       | 3       |
| 05/28/89 | 5       | 10      | 7       | 12      | 15      | 12      | 12      | 8       | 4       | 1       | 5       | 5       | 1       | 6       |
| 05/29/89 | 1       | 1       | 1       | 1       | 1       | 2       |         | 2       |         |         |         | 2       | 1       |         |
| 05/30/89 |         | 4       | 1       | 4       | 2       | 3       | 3       |         |         |         | 2       |         | 1       | 4       |
| 05/31/89 | 2       | 4       | 2       | 4       | 3       | 3       | 3       | 5       |         |         | 3       | 2       | 4       | 4       |
| Totals:  | 405     | 509     | 463     | 646     | 176     | 152     | 149     | 150     | 79      | 66      | 241     | 216     | 145     | 213     |

Appendix E-3. Daily summary of branded accelerated growth chinook sub-yearlings captured at the Rock Island Dam bypass trap, June, 1989.

| Date     | LA/IH/1 | LA/IH/3 | RA/IH/1 | RA/IH/3 | LA/II/1 | LA/II/3 | RA/II/1 | RA/II/3 | RA/IK/1 | RA/IK/3 | LA/IL/1 | LA/IL/3 | RA/IL/1 | RA/IL/3 |
|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 06/01/89 | 9       | 3       | 5       | 18      | 13      | 17      | 18      | 10      | 5       | 2       | 7       | 11      | 3       | 3       |
| 06/02/89 | 6       | 7       | 9       | 11      | 25      | 24      | 15      | 16      | 1       | 3       | 6       | 9       | 5       | 6       |
| 06/03/89 | 2       | 2       | 2       | 5       | 13      | 9       | 4       | 12      | 1       | 2       | 1       | 2       | 1       | 3       |
| 06/04/89 | 3       | 2       |         | 1       | 19      | 12      | 11      | 17      |         | 1       | 1       | 1       |         | 3       |
| 06/05/89 | 1       | 3       |         | 3       | 20      | 3       | 5       | 11      | 1       | 1       |         | 2       |         | 3       |
| 06/06/89 | 4       |         | 2       | 4       | 17      | 19      | 11      | 13      | 2       |         | 1       | 1       |         | 2       |
| 06/07/89 | 3       | 1       |         | 4       | 8       | 15      | 10      | 10      | 4       | 1       |         | 3       | 1       | 3       |
| 06/08/89 | 2       | 1       |         | 1       | 14      | 13      | 18      | 11      |         |         | 1       | 1       |         | 2       |
| 06/09/89 |         | 1       | 1       | 1       | 9       | 7       | 9       | 5       | 1       |         |         |         |         | 1       |
| 06/10/89 |         |         | 1       | 1       | 9       | 7       | 4       | 7       | 2       |         | 1       |         |         |         |
| 06/11/89 | 1       |         | 2       |         | 13      | 8       | 11      | 8       | 2       | 1       | 1       |         |         |         |
| 06/12/89 |         |         |         |         | 9       | 9       | 8       | 3       |         | 1       | 1       |         |         | 1       |
| 06/13/89 |         |         |         |         | 4       | 7       | 5       | 4       |         |         |         | 1       |         | 1       |
| 06/14/89 |         |         |         |         | 5       |         | 1       | 3       |         | 1       | 1       | 1       |         | 2       |
| 06/15/89 |         |         |         |         | 3       | 2       | 4       | 5       |         | 2       |         |         | 1       |         |
| 06/16/89 |         |         |         |         | 3       |         | 1       | 1       |         |         |         |         |         |         |
| 06/17/89 |         |         |         |         | 1       | 2       | 6       | 1       |         |         |         |         |         |         |
| 06/18/89 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 06/19/89 |         |         |         |         |         | 1       | 1       | 2       |         |         |         |         |         |         |
| 06/20/89 |         |         |         |         | 2       | 4       | 1       | 4       |         |         |         |         |         | 1       |
| 06/21/89 |         |         |         |         | 2       | 3       | 1       | 6       |         |         |         |         | 2       |         |
| 06/22/89 |         |         |         |         | 2       |         | 2       | 4       |         | 1       |         | 1       |         |         |
| 06/23/89 |         |         |         |         | 1       | 2       | 2       | 2       |         |         |         | 1       |         |         |
| 06/24/89 |         |         |         |         |         | 2       | 1       |         |         |         | 1       |         |         |         |
| 06/25/89 |         |         |         |         | 1       |         |         | 2       |         |         |         |         |         | 1       |
| 06/26/89 |         |         |         |         | 1       |         | 2       | 1       |         |         |         |         |         |         |
| 06/27/89 |         |         |         |         | 3       |         | 1       |         |         |         |         |         |         | 1       |
| 06/28/89 |         |         |         |         |         |         | 1       |         |         |         |         | 1       |         |         |
| 06/29/89 |         |         |         |         |         |         |         | 1       |         |         |         |         |         |         |
| 06/30/89 |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| Totals:  | 33      | 20      | 22      | 49      | 197     | 166     | 153     | 159     | 20      | 16      | 22      | 35      | 13      | 33      |

Appendix E-4. Daily summary of branded accelerated growth chinook sub-yearlings captured at the Rock Island Dam bypass trap, July, 1989.

| Date            | LA/IH/1 | LA/IH/3 | RA/IH/1 | RA/IH/3 | LA/IJ/1 | LA/IJ/3 | RA/IJ/1 | RA/IJ/3 | RA/IK/1 | RA/IK/3 | LA/IL/1 | LA/IL/3 | RA/IL/1 | RA/IL/3 |
|-----------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 07/01/89        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07102189        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07103189        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07/04189        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07105/89        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07106189        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| <b>07/07/89</b> |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| <b>07/08/89</b> |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| <b>07/09/89</b> |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07110189        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07111189        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| <b>07/12/89</b> |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07113189        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07114189        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07/1 5189       |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| <b>07/16/89</b> |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| <b>07/17/89</b> |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07/18189        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07/19189        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| <b>07/20/89</b> |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| <b>07/21/89</b> |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07/22189        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07/23189        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07124189        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07125189        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07126189        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07127189        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07128189        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| <b>07/29/89</b> |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07/30189        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 07131189        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
| <b>Totals:</b>  | 0       | 0       | 0       | 0       | 0       | 1       | 1       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |

Appendix E-5. Daily summary of branded accelerated growth chinook sub-yearlings captured at the Rock Island Dam bypass trap, August, 1989.

| Date     | L A / 1 | H / 1 | LA/IH/3 | RA/IH/1 | RA/IH/3 | LA/IJ/1 | LA/IJ/3 | RA/IJ/1 | RA/IJ/3 | RA/IK/1 | RA/IK/3 | LA/IL/1 | LA/IL/3 | RA/IL/1 | RA/IL/3 |
|----------|---------|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 08101189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08102189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08103189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/04/89 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/05189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/06/89 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/07189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08108/89 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/09189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08110189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/11/89 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/12/89 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/13189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08114189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/15189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08116189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08117189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/18189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/19/89 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08120189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08121/89 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08122189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08123189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08124189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08125189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08126189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08127189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08128189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08129/89 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/30189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| 08/31189 |         |       |         |         |         |         |         |         |         |         |         |         |         |         |         |
| Totals:  | 0       |       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       |

Appendix E-6. Monthly summary of branded accelerated growth chinook sub-yearlings captured at the Rock Island Dam bypass trap, 1 April - 31 August, 1989.

| Month   | LA/IH/1 | LA/IH/3 | RA/IH/1 | RA/IH/3 | LA/II/1 | LA/II/3 | RA/II/1 | RA/II/3 | RA/II/1 | RA/II/3 | LA/II/1 | LA/II/3 | RA/II/1 | RA/II/3 | Totals: |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| April   | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 438     |
| May     | 405     | 509     | 463     | 6,56    | 176     | 152     | 149     | 150     | 79      | 66      | 241     | 216     | 145     | 213     | 438     |
| June    | 33      | 20      | 22      | 49      | 197     | 166     | 153     | 159     | 20      | 16      | 22      | 35      | 13      | 33      | 529     |
| July    | 0       | 0       | 0       | 0       | 0       | 1       | 1       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 485     |
| August  | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 319     |
| Totals: | 438     | 529     | 485     | 695     | 373     | 319     | 303     | 309     | 99      | 82      | 263     | 251     | 158     | 246     | 373     |



ROCK ISLAND DAM **SMOLT** MONITORING, 1990

FINAL REPORT

by

Charles M. Peven

~~Paul C. Fielder~~

*NANCY A. Duree*

**Fish and Wildlife** Operations  
Power Operations Department  
**Public** Utility District No. 1 of **Chelan** County

Prepared for

Dale Johnson, Project Manager  
U.S. Department of Energy  
Bonneville Power Administration  
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Contract Number DE-A179-86BP61748  
Project Number 84-54

October, 1990

## ABSTRACT

Downstream migrating salmon and **steelhead** trout (*Oncorhynchus* spp.) smelts were monitored at the Rock Island Dam bypass trap from 1 April - 31 August, 1990. Data collected included: 1) number of fish caught by species, 2) number of branded fish caught by species, 3) daily average **riverflow**, 4) daily average powerhouse #1 and #2 flows and daily average spill. These data were transmitted to the Fish Passage Center, which manages a smelt monitoring program throughout the Columbia River Basin. The smelt monitoring program is used to manage the “water budget”, releasing upstream water storage allocated to augment river flows to improve survival of downstream migrating **salmonids**.

The Rock Island Dam trapping facility collected 69,475 downstream migrating **salmonids** in 1990. Collected fish included 2,053 chinook salmon (*O. tshawytscha*) and 514 steelhead which had been freeze branded (to determine migration rates) and 3,250 chinook and 8,804 **steelhead** with clipped adipose fins. The middle 80% of the 1990 spring migration (excluding sub-yearling chinooks) passed Rock Island Dam during a 38 day period, 21 April-29 May. Passage rates of chinook and steelhead smelts released from hatcheries and the downstream migration timing of all **salmonids** are presented. The spring migration timing of juvenile **salmonids** is strongly influenced by hatchery releases above Rock Island Dam.

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## INTRODUCTION

In 1982, the Northwest Power Planning Council developed a fish and wildlife program to protect, mitigate and enhance fish and wildlife resources affected by construction and operation of Columbia River hydroelectric facilities. Under this **program**, a “water budget” of allocated upstream water storage was established for **instream** flow augmentation to improve survival of downstream migrating salmon and **steelhead** trout (*Oncorhynchus* spp.). The Council’s plan also called for studies to monitor juvenile fish migration timing and survival. The fishery agencies and tribes formed a Water Budget Center (renamed as the Fish Passage Center) to direct the use of the water budget and to conduct and coordinate studies related to water budget management and evaluation. The Fish Passage Center (FPC) developed a Smelt Monitoring Program and selected several sites on the Columbia and Snake rivers as smelt monitoring stations. Rock Island Dam was selected as one of these stations. It is the first dam located downstream from all of the major salmon and steelhead producing tributaries of the mid-Columbia River Basin (Figure 1).

The Smelt Monitoring Program for the mid-Columbia River was designed to index the daily number of **outmigrating salmonids** and to report numbers of marked juveniles collected. Data collected under this program allow comparison and evaluation of year to year migration timing and travel time of different stocks of juvenile **salmonids**, both hatchery and naturally produced.

Funding of the program, as implemented by the Fish Passage Center, was provided by the Bonneville Power Administration. The Public Utility District No. 1 of **Chelan** County (the District) provided the trapping facility, personnel, and equipment to conduct the monitoring.

## METHODS

Daily sampling data collected **at** the Rock Island Dam monitoring station included 1) total number of fish caught by species. 2) total number of branded fish caught by species, 3) daily average riverflow, 4) daily average flow through Rock Island powerhouse #1 (old powerhouse) and Rock Island #2 (new powerhouse) (Figure 2), and daily average spill. **The** flow data were recorded so that an expanded index of fish passage through powerhouse #2 could be developed based on the bypass collection count in relation to the proportion of total riverflow passing through powerhouse #2.

To provide travel time estimates between hatchery release points and downstream sampling stations, including Rock Island **Dam**, yearling and sub-yearling chinook and steelhead from state and federal hatcheries were freeze branded (using liquid nitrogen) before release. All hatchery produced **steelhead** released in Washington state waters have been adipose fin clipped since 1985. A comparison between the release date of marked smelts and daily recoveries of these branded **smolts** at the bypass trap provided travel time estimates between

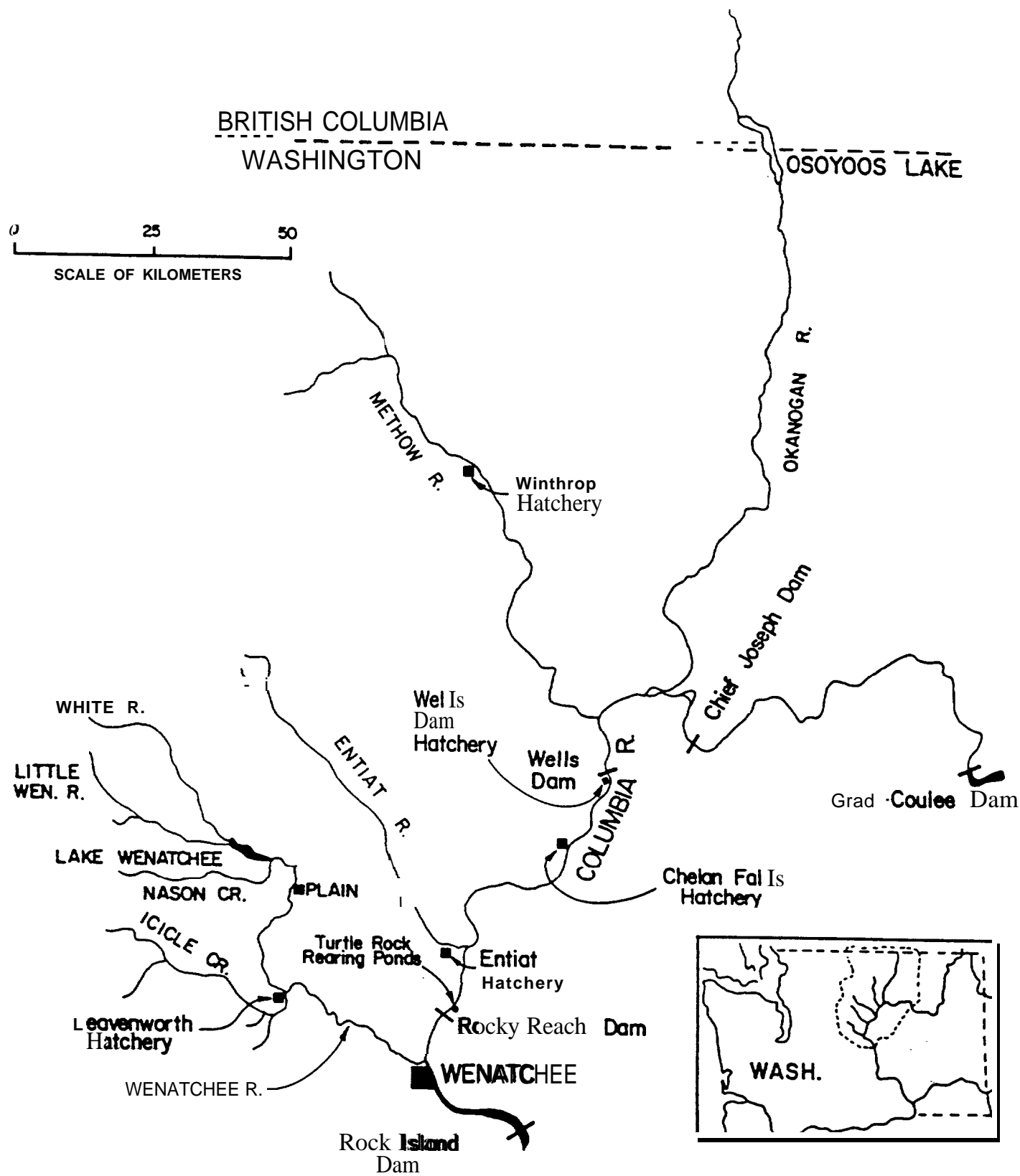


Figure 1. Columbia River between Rock Island and Grand Coulee dams showing major tributaries and hatcheries.

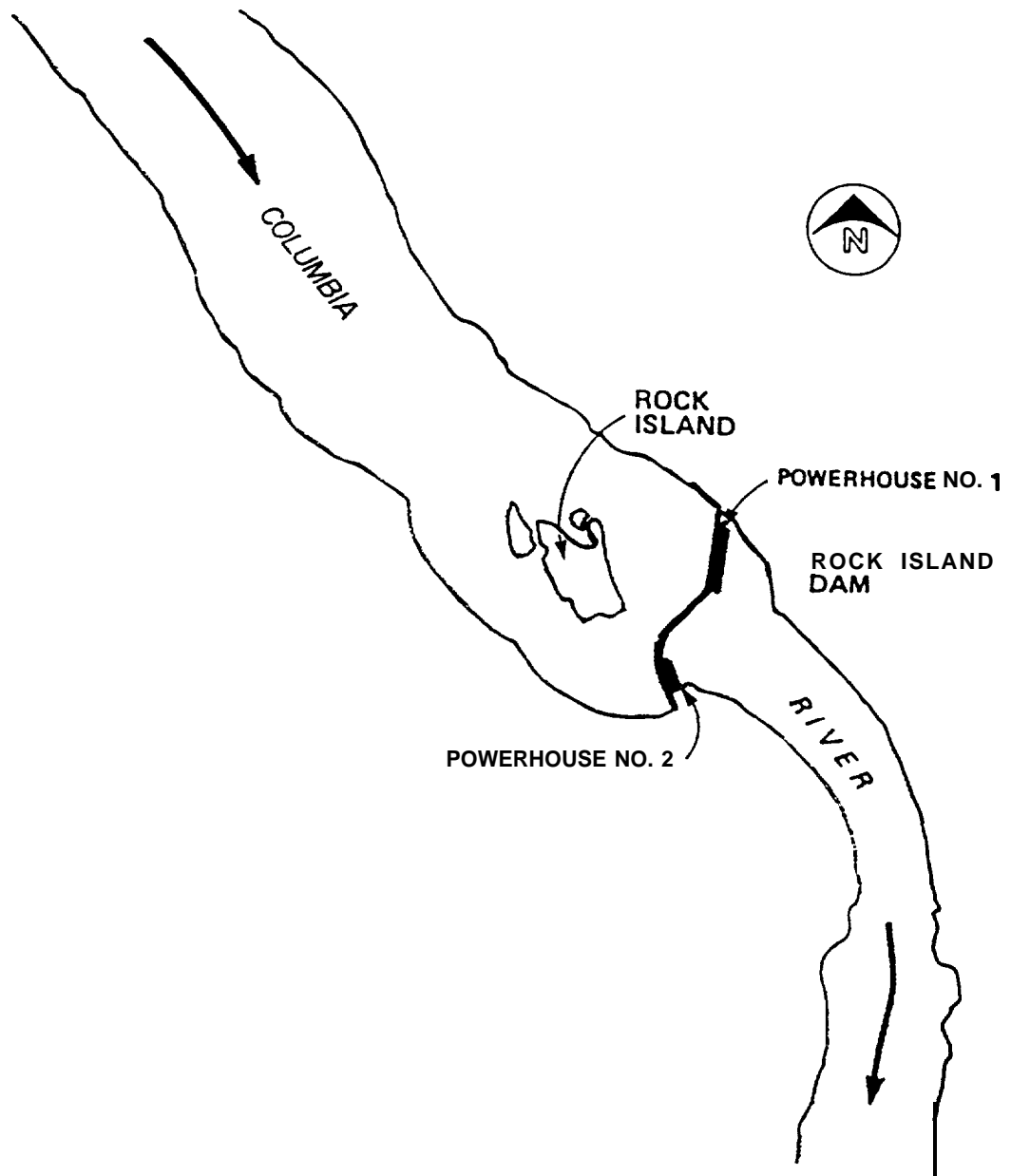


Figure 2. Location of powerhouse #1 and powerhouse #2 of Rock Island hydroelectric project.



the release points and the darn. Unmarked hatchery and naturally produced salmonids were also sampled to determine the timing of their migration past Rock Island Dam.

Fish were collected from the Rock Island Dam second powerhouse turbine intake gatewells and fishway attraction water intake. Fish entering the gatewells and attraction water intake passed into a bypass channel through a series of submerged orifices (Figure 3). An inclined screen trap separated the fish from the 100 cfs bypass flow and confined them to a holding flumes where they were retained for up to 24 hours before processing (Figure 4). All fish collected in the bypass channel were processed.

Fish collected by the trap during the 24 hour sampling period (0900-0900) were crowded into an elevator hopper, raised to the upper deck of the dam, and released into an 8' x 8' x 3' portable fiberglass holding tank (Figure 5). The holding tank was supplied with a continuous water flow from the right bank fishladder with a 5 horsepower submersible pump.

Groups of 30-50 fish were anesthetized with a solution of Tricaine methane sulfonate (MS 222) before handling. Fish were identified by species and examined for brands and clipped fins in a sampling shed adjacent to the holding tank (Figure 5). Fork length (FL) measurements were taken three times per week from subsamples of sockeye (*O. nerka*), and after 1 June, from sub-yearling chinook. Steelhead were categorized as "hatchery" or "naturally-produced" according to clipped adipose fin, or if an adipose fin was present, a worn appearance of the dorsal and ventral fins (Peven and Hays 1989). The fish were then allowed to recover in an isolated section of the release tank.

After the examined fish had fully recovered from the effects of the anesthesia, they were released through a 4" PVC pipe from the recovery section of the tank (elevation 620 m.s.l.) to the tailrace (elevation 574' m.s.l.) (Figure 5). The release area of the tailrace was protected from gull predation with parallel lengths of 80 pound test monofilament fish line tied at approximately 6 foot intervals overhead of the pipe outlet. In addition, an employee of the U. S. Department of Agriculture's Animal Damage Control Division suppressed gull foraging in the tailrace during the middle 80% of the spring migration by various behavior modifying techniques.

Data pertinent to the smelt monitoring program were transferred to the FPC (Portland, OR) daily via a computer that was located at the dam.

In addition to the smelt monitoring program, subsamples of chinook yearlings and steelhead were injected with Passive Integrated Transponder (PIT) tags each day between 24 April and 23 May. Equipment and procedures used in the PIT tagging operation were similar to the methods described by Prentice et al. (1987). A random subsample of chinook and steelhead were processed until 100 of each species were tagged. Data were entered into a portable computer and sent to the FPC daily. The fish that were PIT tagged at Rock Island Dam were "recaptured" at the McNary Dam bypass trap, where travel time estimates were recorded. Results of the PIT tagging program are reported by the FPC.

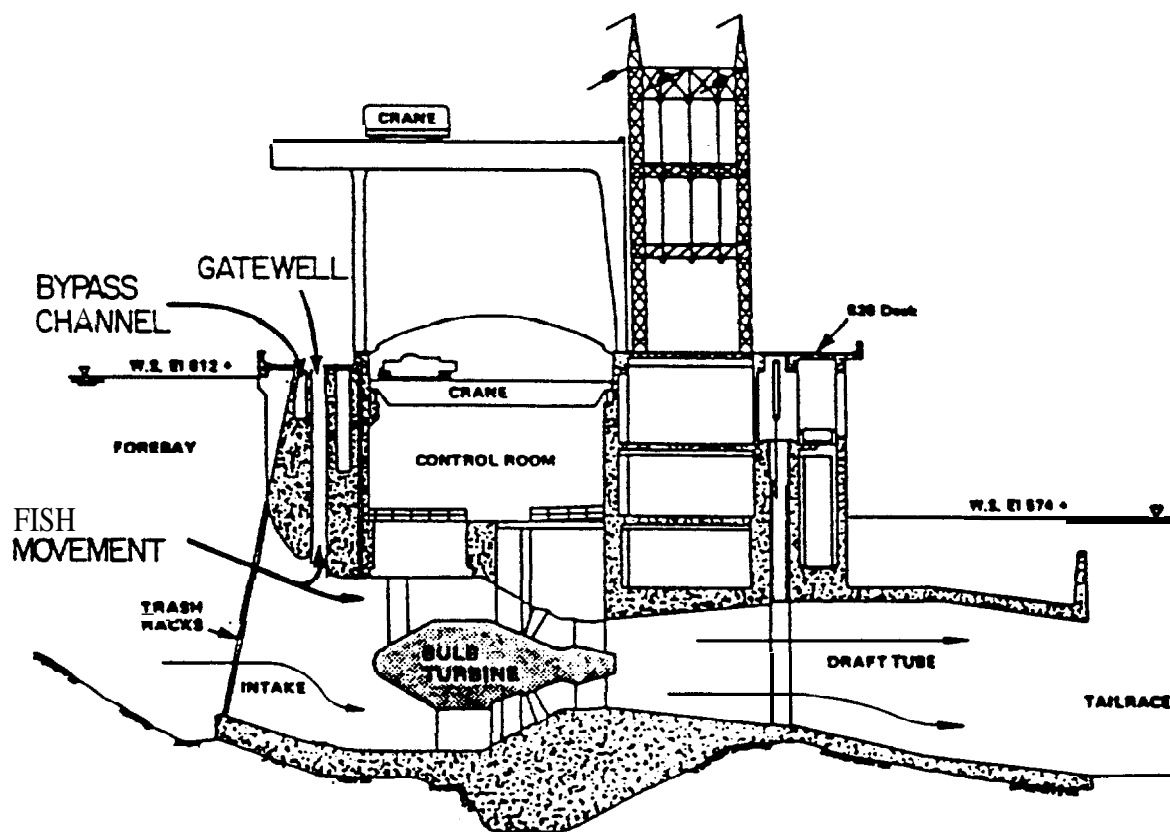


Figure 3. Section through Rock Island Dam second powerhouse indicating fish movement into gatewell system.

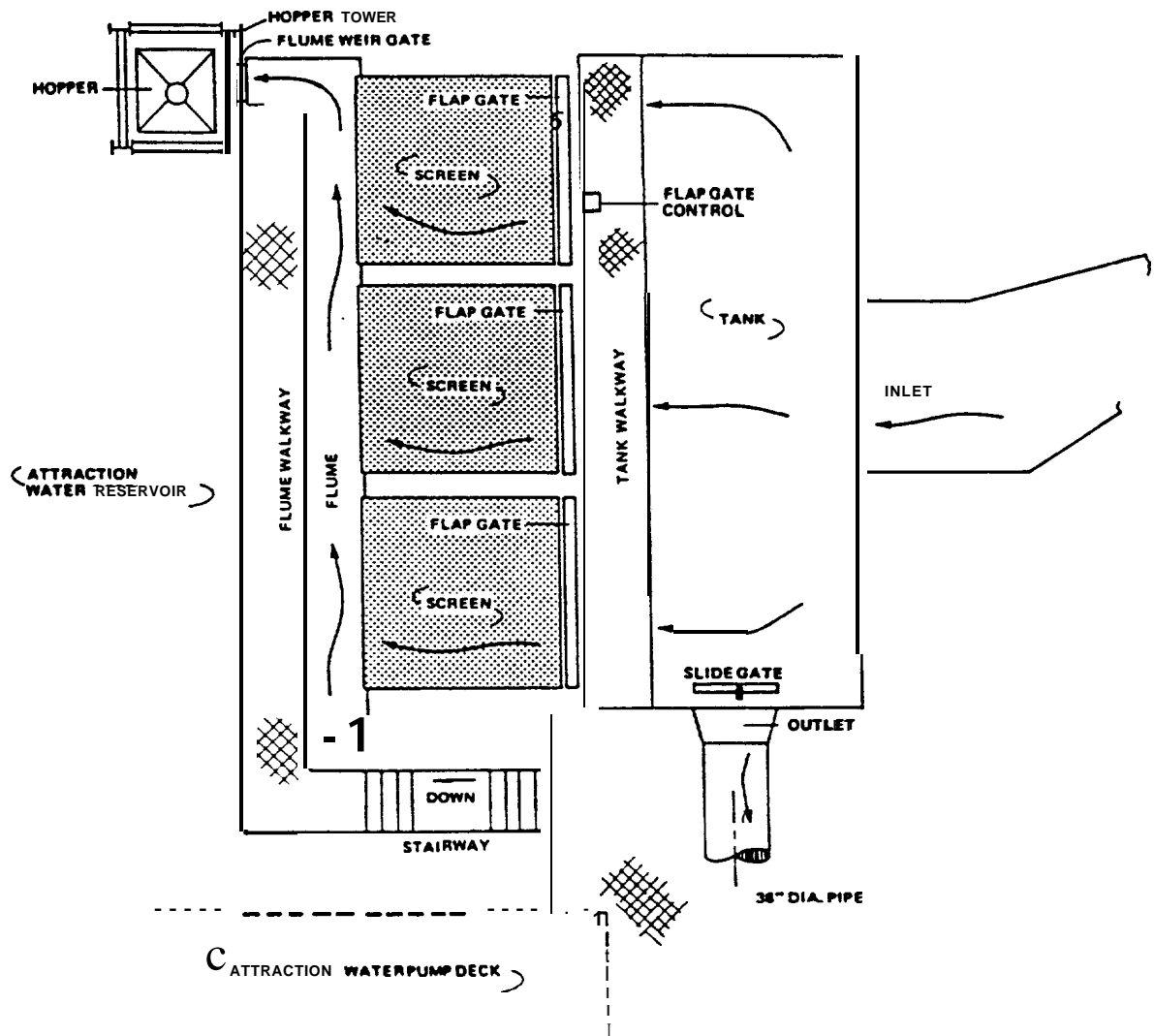


Figure 4. Rock Island Dam juvenile salmonid fingerling collection trap.

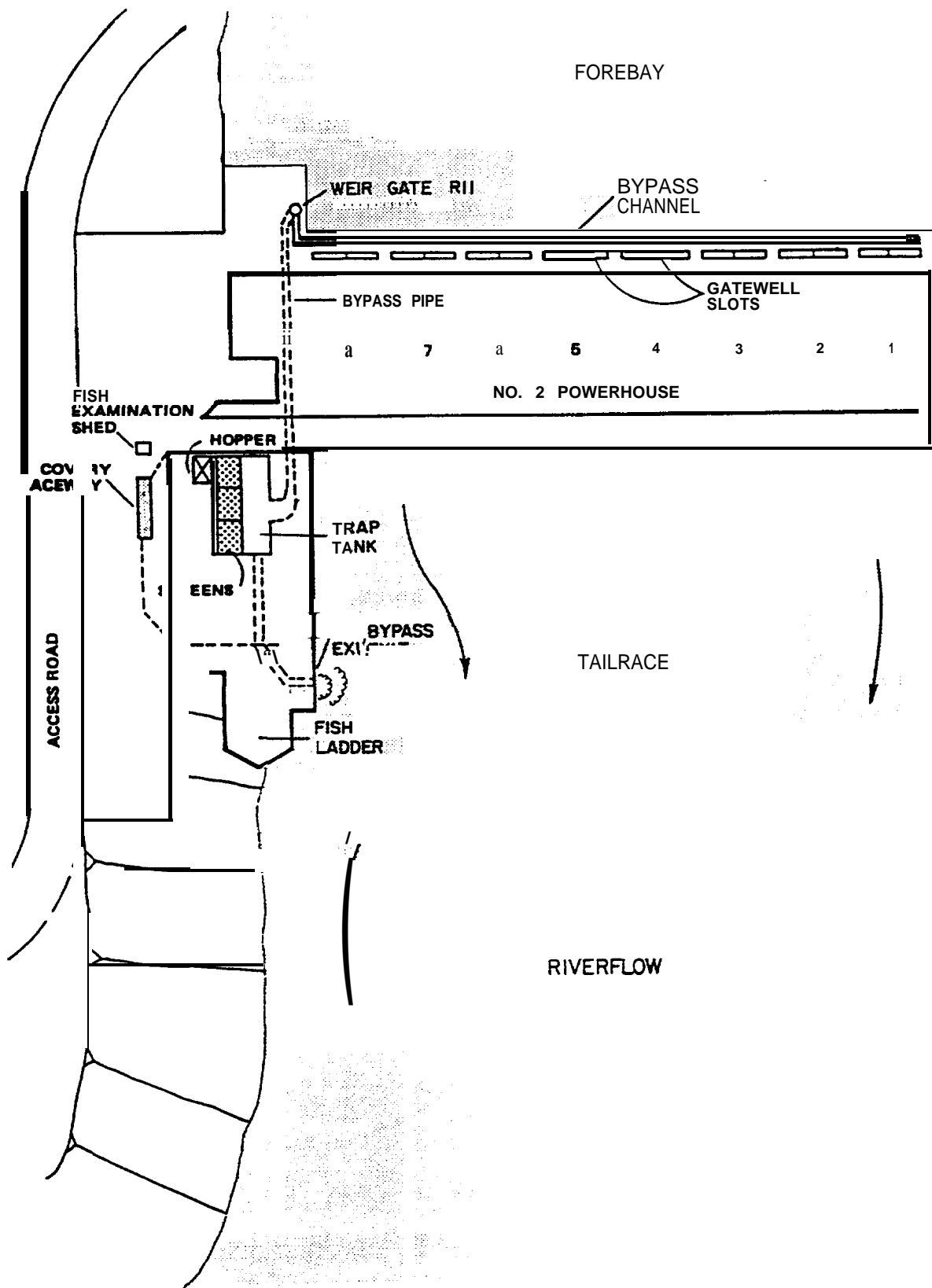


Figure 5. Plan view of juvenile salmonid bypass and collection system at Rock Island Dam second powerhouse (taken from Olson 1983).

## RESULTS AND DISCUSSION

The Rock Island Dam trapping facility collected 69,475 juvenile salmon. and steelhead during the 1990 smelt monitoring program (Appendix A). A total of 2,053 freeze branded chinook salmon and 514 freeze branded steelhead trout, representing 22 distinct marks and releases, were collected and recorded during 1990 (Table 1, Apps. D and E). In addition, we collected 3,250 chinook and 8,804 steelhead with clipped adipose fins (Appendix D-1 - D-6).

The bypass trapping facility operated without mechanical failure during the smelt monitoring program. An examination of daily powerhouse #2 turbine flows in proportion to total river flow showed a variance in powerhouse operations during the period of peak salmonid outmigration. Monthly average percent of total flow through powerhouse #2 for the period of 1 April through 30 June ranged from 48.3 to 65.4 % and daily averages ranged from 27.2 to 88.0% (Table 2).

Average daily hydraulic data for Rock Island Dam were supplied to the FPC, which used it to develop an expansion of Rock Island trap data (Appendix B). The expansion was derived by multiplying the actual trap collection count by the inverse proportion of water passing through powerhouse #2 during the sampling period (i.e., (collection count x 100) / (powerhouse #2 flow / powerhouse #1 flow + powerhouse #2 flow + spill)). A comparison of actual trap collection counts, the expanded index, and the six year average (Table 3) indicated some differences in the smelt run timing.

The largest difference in the run timing was a 15 day difference in the 90% passage date for total salmonids between the actual counts for 1990, and the 6 year average (Table 3, App. C-2). Other run timing differences were generally within 3 to 4 days (Table 3). We used actual count data in our analysis and discussion.

### I. MIGRATION TIMING

#### Yearling chinook

A total of 12,905 chinook yearlings were captured at the bypass trap in 1990 (App. A). Yearling chinook were present the first day of the smelt monitoring program, 1 April, and continued to be present every day until 12 June (App. A). The last yearling chinook was collected on 15 August (App. A). The 10 and 90% passage dates for yearling chinook were 20 April and 15 May, respectively. Peak passage of 1,643 yearling chinook occurred on 20 April, 1 and 2 days after major hatchery releases from the Entiat and Leavenworth national fish hatcheries, respectively (Table 1). The 90% passage date of chinook yearlings in 1990 was 8 days earlier than the 6 year average, while the 10% passage date matched the 6 year average and the 50% passage date was 7 days earlier than the 6 year average. ( Table 3, App. C-1).

Table 1. Summary of brand recovery rates for yearling chinook, sub-yearling chinook, and steelhead trout from the Rock Island Dam bypass trap, 1 April -31 August, 1990.

| Species                                | Brand   | Release date | Release site | Branded fish released | First recov. date | Last recov. date | 10% recov. date | 50% recov. date | 90% recov. date | Number recov. | Percent recov. |
|--|---------|--------------|--------------|-----------------------|-------------------|------------------|-----------------|-----------------|-----------------|---------------|----------------|
| <i>Chinook yearling</i>                | RA/7N/1 | Apr 19       | Entiat R.    | 17,723                | Apr 21            | May 15           | Apr 21          | Apr 24          | Apr 30          | 27            | 0.15           |
|  | RA/7N/3 | Apr 19       | Entiat R.    | 17,623                | Apr 21            | May 08           | Apr 21          | Apr 24          | May 07          | 35            | 0.20           |
|  | LA/7T/1 | Apr 18       | Wenat. R.    | 16,846                | Apr 19            | Jun 06           | Apr 20          | May 02          | May 12          | 97            | 0.58           |
|  | LA/7T/3 | Apr 18       | Wenat. R.    | 16,928                | Apr 20            | Jun 04           | Apr 20          | May 01          | May 16          | 67            | 0.40           |
|  | RD/7T/1 | Apr 18       | Wenat. R.    | 17,212                | Apr 20            | May 15           | Apr 20          | Apr 27          | May 11          | 47            | 0.27           |
|  | RA/Y/1  | May 04       | Wenat. R.    | 12,400                | May 05            | Jun 04           | May 05          | May 14          | May 31          | 32            | 0.26           |
|  | RA/Y/2  | May 04       | Wenat. R.    | 12,100                | May 05            | Jun 11           | May 06          | May 15          | Jun 03          | 29            | 0.24           |
|  | RA/Y/3  | May 04       | Wenat. R.    | 13,100                | May 05            | Jun 04           | May 05          | May 14          | May 30          | 33            | 0.25           |
|  | RA/Y/4  | May 04       | Wenat. R.    | 14,200                | May 05            | Jun 06           | May 05          | May 14          | May 30          | 29            | 0.20           |
|  | LD/7C/1 | Apr 17       | Methow R.    | 16,900                | Jun 06            | Jun 06           | Jun 06          | Jan 06          | Jun 06          | 1             | 0.01           |
|  | RA/7C/1 | Apr 17       | Methow R.    | 17,395                | May 03            | May 31           | May 03          | May 14          | May 16          | 6             | 0.03           |
|  | RA/7C/3 | Apr 17       | Methow R.    | 17,320                | Apr 26            | May 22           | Apr 26          | May 16          | May 21          | 9             | 0.05           |
|  | Total:  |              |              | 189,747               |                   |                  |                 |                 |                 | 412           | 0.22           |
| <i>Accelerated chinook subyearling</i> | LA/Y/1  | May 04       | Wenat. R.    | 31,200                | May 05            | Jul 15           | May 05          | May 06          | Jun 14          | 387           | 1.24           |
|  | LA/Y/2  | May 04       | Wenat. R.    | 31,700                | May 05            | Jun 20           | May 05          | May 06          | Jun 11          | 339           | 1.07           |
|  | LA/Y/3  | May 04       | Wenat. R.    | 31,000                | May 05            | Jun 28           | May 05          | May 06          | Jun 10          | 399           | 1.29           |
|  | LA/Y/4  | May 04       | Wenat. R.    | 31,200                | May 05            | Jun 19           | May 05          | May 06          | Jun 08          | 346           | 1.11           |
|  | Total:  |              |              | 125,100               |                   |                  |                 |                 |                 | 1,471         | 1.18           |
| <i>Chinook subyearling</i>             | LA/H/1  | May 25       | Wells Dam    | 50,000                | Jun 01            | Jul 26           | Jun 07          | Jun 26          | Jul 04          | 100           | 0.20           |
|  | LA/H/3  | May 25       | Wells Dam    | 50,000                | Jun 03            | Jul 08           | Jun 09          | Jun 24          | Jul 01          | 70            | 0.14           |
|  | Total:  |              |              | 100,000               |                   |                  |                 |                 |                 | 170           | 0.17           |
| <i>Steelhead</i>                       | LD/7H/1 | Apr 24       | Smklmn R.    | 20,000                | Apr 28            | Jun 02           | May 06          | May 11          | May 14          | 188           | 0.94           |
|  | LD/7H/3 | Apr 24       | Smklmn R.    | 20,000                | May 03            | May 28           | May 06          | May 11          | May 15          | 171           | 0.86           |
|  | RA/7H/1 | Apr 24       | Methow R.    | 15,000                | Apr 29            | May 31           | May 03          | May 10          | May 19          | 72            | 0.48           |
|  | RA/7H/3 | Apr 24       | Methow R.    | 15,000                | Apr 29            | May 31           | May 03          | May 10          | May 22          | 83            | 0.55           |
|  | Total:  |              |              | 70,000                |                   |                  |                 |                 |                 | 514           | 0.73           |
| Grand totals:                          | 22      |              |              | 484,847               |                   |                  |                 |                 |                 | 2,567         | 0.53           |

Table 2, Rock Island Dam powerhouse operations expressed in KCFS and percent streamflow,  
1 April -31 August, 1990 (monthly ranges appear in parenthesis).

|                  | Average KCFS                  |                           |                            |                           |                       |
|------------------|-------------------------------|---------------------------|----------------------------|---------------------------|-----------------------|
|                  | April                         | May                       | June                       | July                      | August                |
| Total river flow | 136.7<br>(66.1-172.6)         | 142.5<br>(103.9-182.7)    | 209.3<br>(146.8-250.3)     | 146.9<br>(95.4-198.9)     | 109.4<br>(78.5-136.7) |
| Powerhouse #1    | 38.7<br>(8.0-68.6)            | 25.3<br>(2.3-60.0)        | 60.6<br>(38.7-69.8)        | 41.5<br>(14.0-69.0)       | 25.8<br>(8.0-49.7)    |
| Powerhouse #2    | 88.3<br>(57.1-101.2)          | 90.9<br>(60.9-116.4)      | 99.3<br>(58.5-123.2)       | 91.4<br>(61.6-117.9)      | 82.8<br>(63.1-102.6)  |
| Spill            | 8.7<br><b>(0.0-34.5)</b>      | 25.1<br><b>(0.0-40.6)</b> | 47.8<br><b>(0.0-111.6)</b> | 12.9<br><b>(0.0-61.5)</b> | 0<br><b>(0.0-0.4)</b> |
|                  | Average percent of total flow |                           |                            |                           |                       |
|                  | April                         | May                       | June                       | July                      | August                |
| Powerhouse #1    | 27.4<br>(10.2-39.7)           | 16.9<br>(2.2-34.3)        | 29.3<br>(23.7-38.4)        | 26.4<br>(14.4-40.6)       | 23.0<br>(9.3-39.4)    |
| Powerhouse #2    | 65.4<br>(56.7-86.4)           | 64.3<br>(54.9-88.0)       | 48.3<br>(27.2-72.9)        | 65.7<br>(34.1-84.9)       | 76.2<br>(59.6-89.0)   |
| Spill            | 6.4<br><b>(0.0-30.4)</b>      | 17.9<br><b>(0.0-31.8)</b> | 21.6<br><b>(0.0-46.9)</b>  | 7.1<br><b>(0.0-33.4)</b>  | 0<br><b>(0.0-0.3)</b> |





### **Sub-yearling chinook**

A total of 32,803 chinook sub-yearlings were captured at the bypass trap in 1990 (App. A-6). Sub-yearling chinook were collected each day from **1 April** to **31 August**. Peak passage of 1,022 sub-yearling chinook occurred on 16 July. The **10** and **90%** passage dates were **3 June and 2 August, respectively, while the 50%** passage date for sub-yearling chinook was 11 July (Table 3, App. C-2). Fork length measurements were taken from sub-yearling chinook between 1 June and 15 August (Figure 6).

For the third year in row, an experiment was conducted by Parametrix of Bellevue, Washington to determine the effect of accelerated growth on smoltification of sub-yearling chinook. These fish were included in the daily number of sub-yearling chinook that were sampled, and account for most of the sub-yearlings caught in May (App. A)

### **Steelhead**

A total of 11,095 steelhead smelts were collected at the bypass trap in 1990 (App. A-6). Daily collection of steelhead smelts began on 3 April and continued until 22 July, after which, steelhead were intermittently collected in low numbers (< 10) until 31 August. Peak passage of 659 steelhead occurred on 14 May, 3 days later than the 50% passage date. The 10 and 90% passage dates were 26 April and 1 June, respectively (Table 3, App. C-3), which were 9 days earlier and 1 day later than the 6 year average.

As in 1989, rainbow trout that were released into Lake Roosevelt (above Grand Coulee Dam) were collected at the Rock Island Dam bypass trap. Positive identification of these fish was possible because some of the fish were tagged (Al Scholz, pers. comm.). These fish were of obvious hatchery origin, because of the condition of their dorsal fins, and were included in the number of hatchery fish sampled per day, even though they all had adipose fins present. For a period between 5 and 29 June, the number of Lake Roosevelt rainbow trout (distinguished from steelhead by morphologic-al characteristics) were enumerated on a daily basis and included in the number of hatchery fish sampled per day. We found that these fish made up approximately 73% of the hatchery fish for that time period. These fish were not part of the hatchery release steelhead program, and should not be included in estimates of anadromous steelhead smelt run timing. It is not clear whether or not they influenced the run timing estimates, although they did influence the hatchery-naturally produced proportions of the run (Peven 1990).

Fork length measurements were obtained while PIT tagging and are presented in Figure 7. Steelhead fork length measurements have been recorded since 1986 to index the size difference between hatchery and naturally produced components of the run. Hatchery fish made up approximately 79% of the steelhead juveniles recorded at the bypass trap in 1990 (Peven 1990), however the proportion of hatchery fish is biased upward because Lake Roosevelt rainbow trout were included in the samples.

# Frequency

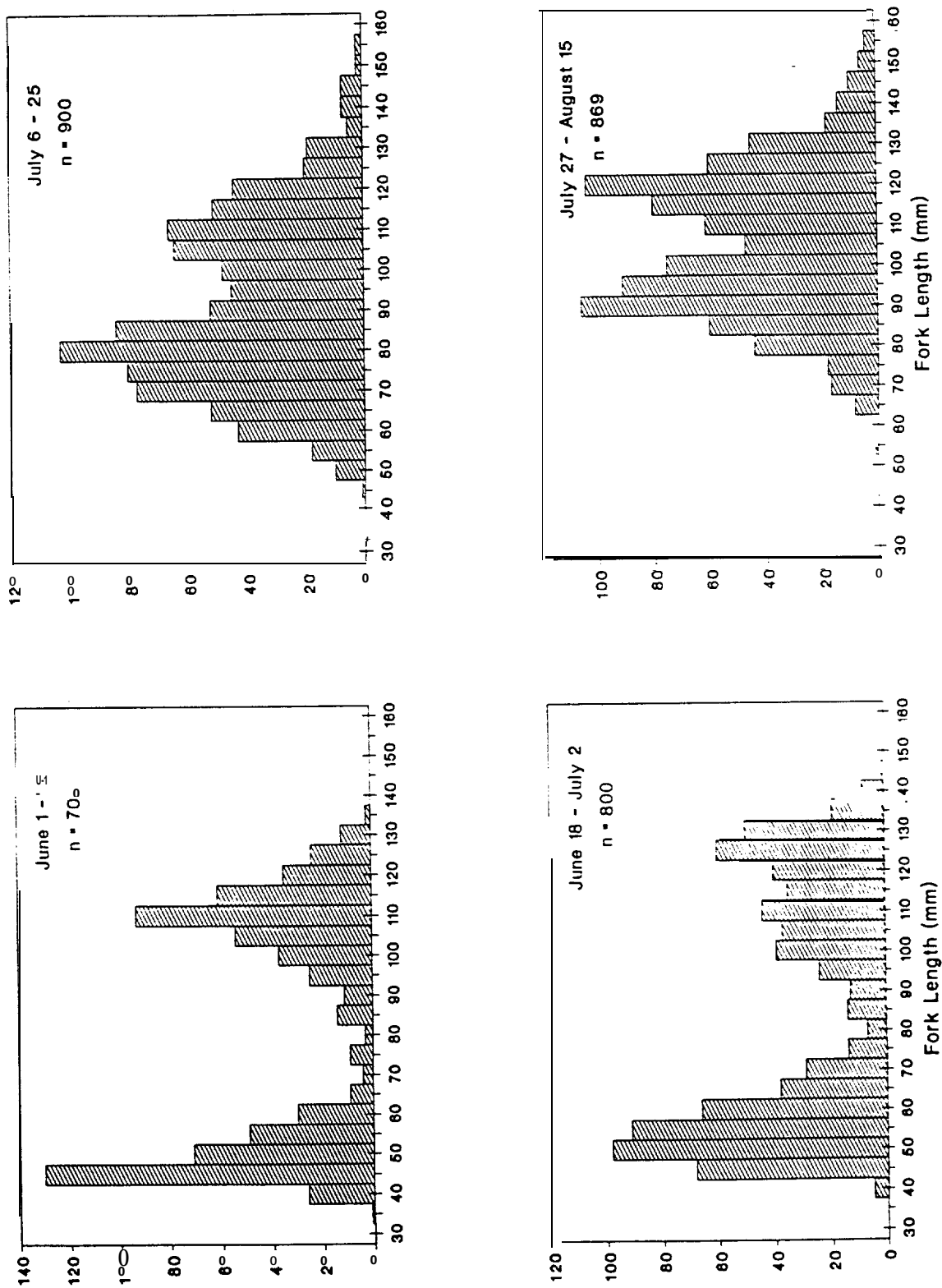


Figure 2 Length frequency histograms of sub-yearling chinook salmon, collected at the Rock Island Dam bypass trap, 1990.

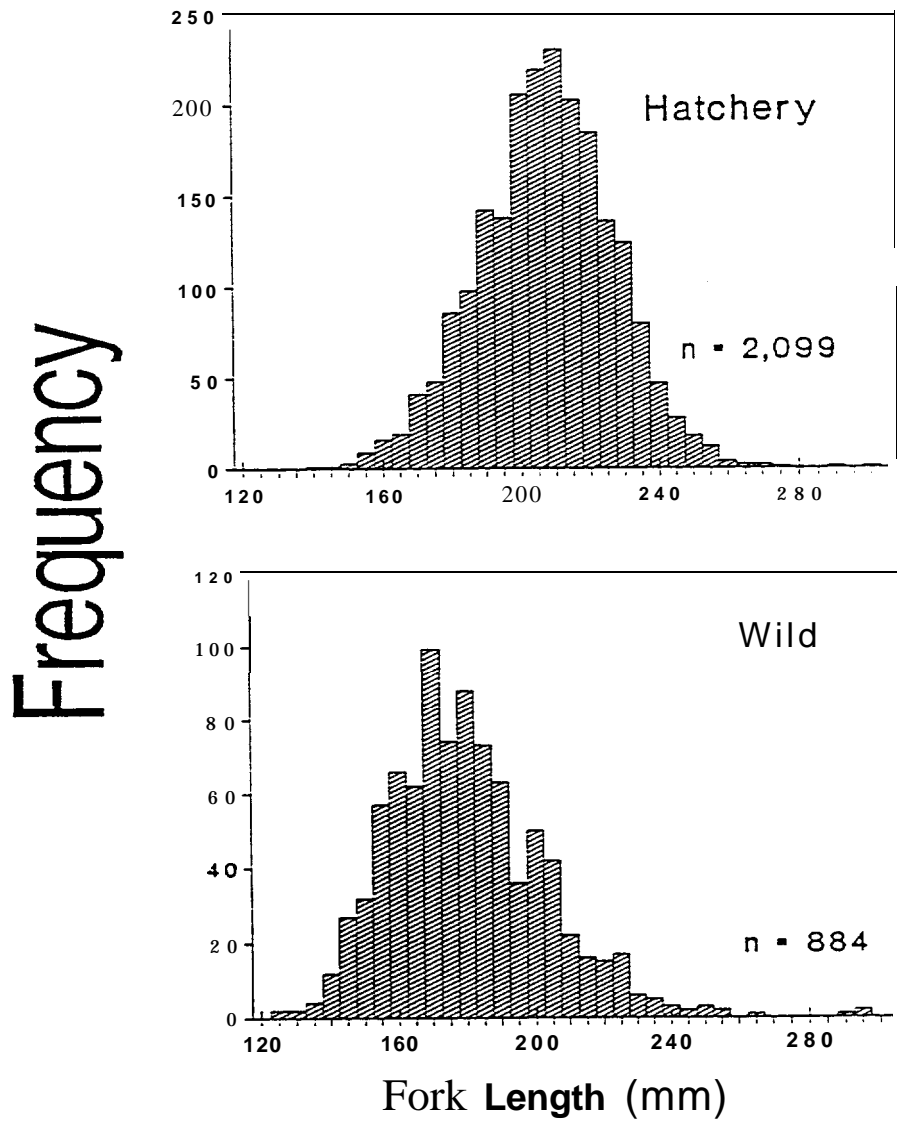


Figure 7. Length frequency histograms of hatchery and naturally produced steelhead trout smelts collected at the Rock Island Dam bypass trap, 1990.

### Sockeye

A total of 2,673 sockeye smolts were collected at the bypass trap in 1990 (App. A-6). Sockeye smelts were present at Rock Island Dam on the fifth day of the monitoring program, 5 April. The last sockeye smelt was trapped on 28 August. Peak passage occurred on 27 April when 174 sockeye smelts were collected. The 10 and 90% passage dates were 18 April and 2 June, respectively, while 50% of the outmigrating sockeye smelts had passed Rock Island Dam by 2 May (Appendix C-4).

In 1990, the downstream migration of sockeye was not as strongly bimodal as in the previous years (App. C-5). The usual bimodal run timing occurs because two stocks of sockeye pass Rock Island Dam on their seaward migration (Okanogan and Wenatchee rivers). Wenatchee River outmigrants pass Rock Island Dam primarily in April and Okanogan River smelts are more prevalent at Rock Island Dam in May (Peven 1987). It appears that in 1988, 1989, and 1990, the Okanogan stock of sockeye did not migrate in large numbers (Peven 1988, 1989). Length frequencies were taken from sockeye smelts between 16 April and 8 June (Figure 8). Length frequency data has been collected from sockeye smelts since 1986 to distinguish between the two stocks that migrate past the dam, with the Okanogan stock generally being larger than the Wenatchee stock (Peven 1987).

This year we saw 128 sockeye that were extremely large ( $> 275$  mm FL), that were not included in the daily catch. Between 23 May and 1 July, these fish made up 6.3% of the sockeye sampled. Because of the large size of these individuals, we were uncertain if these fish were downstream migrants, or perhaps kokanee that escaped from Lake Roosevelt or other lakes upstream. In 1989, otoliths were taken from approximately 15 fish that were already dead when found in the bypass trap. The age readings that we obtained from the otoliths showed that these fish were at least 3 years old, with some of the fish aged as 5 years old, which suggests they were probably kokanee, not sockeye smelts.

### Coho

A total of 9,999 coho (*O. kisutch*) were captured at the bypass trap in 1990 (App. A-6). Daily presence of coho smelts began on 3 May and continued until 16 June (App. A). The last coho was collected on 19 June. Peak passage of 1,074 coho smelts occurred on 21 May (Appendix A-2, C-5). The 10, 50, and 90% passage dates for coho were 8, 18, and 29 May, respectively. The 10, 50, and 90% passage dates for coho in 1990 were 6, 4, and 1 day(s), respectively, earlier than the 6 year average (Table 3, App. C-4).

### Total salmonid run

A total of 69,475 juvenile salmonids were collected at the bypass trap in 1990. The total salmonid run timing is represented in Appendix C-6. The early peak passage count of 1,831 on 20 April was largely influenced by the large collection of yearling chinook ( $n = 1,643$ ). The 8 May peak count of 1,903 consisted of coho ( $n = 624$ ) and steelhead ( $n = 581$ ) and yearling chinook ( $n = 536$ ) (App. A-1, A-2, C-6).

## Frequency

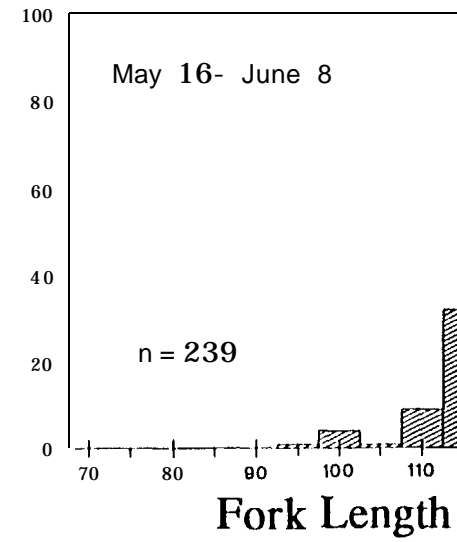
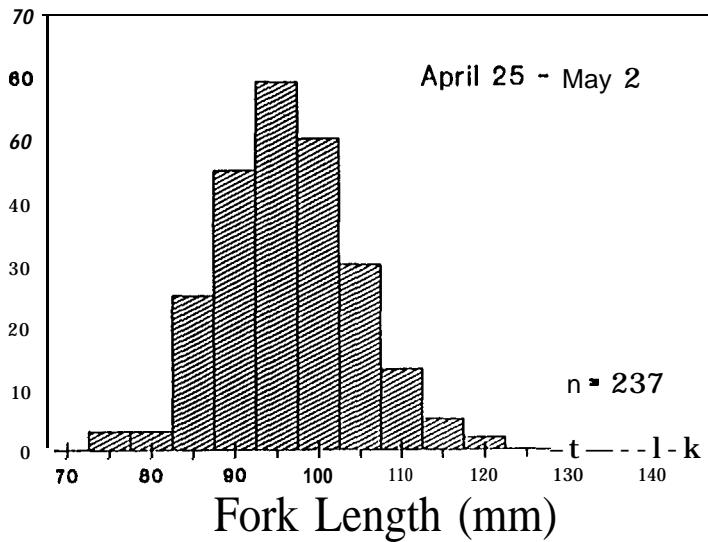
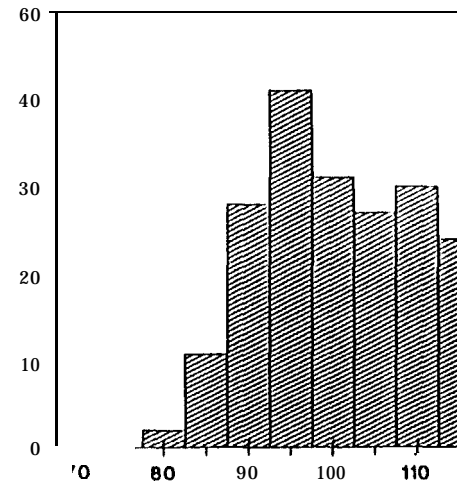
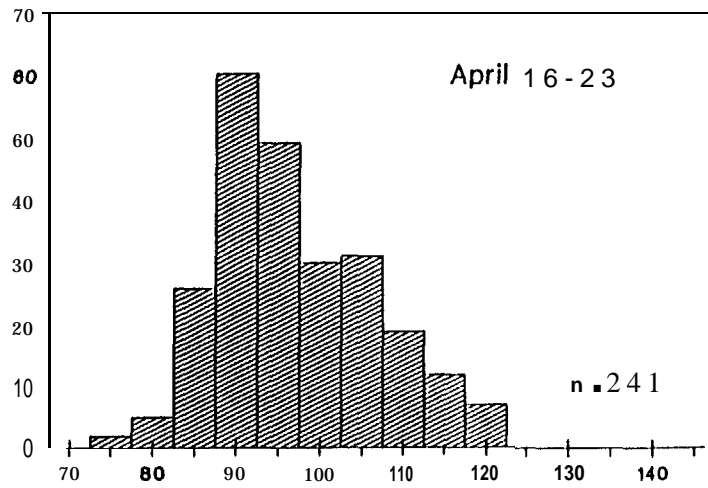


Figure 8. Length frequency histograms of sockeye smelts collected at the R Dam bypass trap, 1990.

The effect of sub-yearling chinook was assessed on the 10,50, and 90% dates for the total cumulative juvenile salmonid migration. A comparison was made between 1990 and the six year average (1985 - 1990) between the total juvenile **outmigration** past Rock Island Dam and the **outmigration** excluding sub-yearling chinook (Figures 9). The duration of the middle 80% of the total juvenile **salmonid** passage (10% date to 90% date) 'was 92 days, 25 April to 26 July with a 50% passage date on 26 May, compared to a 79 day duration for the 6 year average, with **10, 50, and 90%** passage dates: 23 April, 21 May, and 11 July, respectively (Table 3, Figure 9). Excluding sub-yearling chinook from this analysis results in a spring migrant run duration of 38 days, 21 April to 29 May, with a 50% passage date on 9 May, compared to a 38 day duration for the six year average, with **10, 50, and 90%** passage dates: 21 April, 17 May, and 29 May, respectively (Table 3, Figure 9, App. C-7).

In summary, in 1990, sub-yearling chinook extended the **juvenile** migration 90% passage date 58 days; from 29 May (spring migration) to 26 July (**total** migration). Run timing in 1990 was 13 days longer than the six year average. The middle **80%** of the total juvenile **salmonid** migration past Rock Island Dam in 1990 was 92 days compared to 79 days for the six year average. Excluding sub-yearlings from **this comparison**, the **spring** migration past the dam in 1990 was 38 days, exactly the same as the six year average.

## II. MARKED FISH RECOVERIES

Twenty-two groups of freeze branded hatchery fish totaling 484,847 fish (Table 1) were released into the Columbia River system upstream from Rock Island Dam to evaluate the relationships between Columbia River flow rates and travel time. These releases consisted of 137,947 chinook yearlings (51,800 were controls released from Leavenworth as part of the Parametric study), 176,900 accelerated growth chinook sub-yearlings released from the Leavenworth hatchery, 100,000 sub-yearling chinook released at Wells **Dam**, 40,000 **steelhead** released into the **Similkameen** River, and 30,000 steelhead released **into** the Methow River. Table 1 presents information concerning these releases as well as recovery **data**, including: first, last, 10,50, and 90% recovery dates and number and percent recapture of each release group.

### Leavenworth National Fish Hatchery

#### Yearling chinook

The first brands were recovered at Rock island Dam on 19 April, from of yearling chinook released 18 **April** from Leavenworth National **Fish** Hatchery. The 50% recovery date at Rock Island Dam for the 3 groups of Leavenworth branded yearling **spring** chinook were 27 **April** and 1 and 2 May, resulting in a median travel **time** of 9, 13, and 14 days (Table 1). The last branded chinook from Leavenworth was recovered on 6 June. The Rock Island Dam bypass trap sampled 0.27- 0.58% of the fish from these brand groups (Table 1). Other releases of yearling chinook from the Leavenworth hatchery were part of the Parametric experiment and had median passage dates ranging from 3 to 11 days (Table 1).

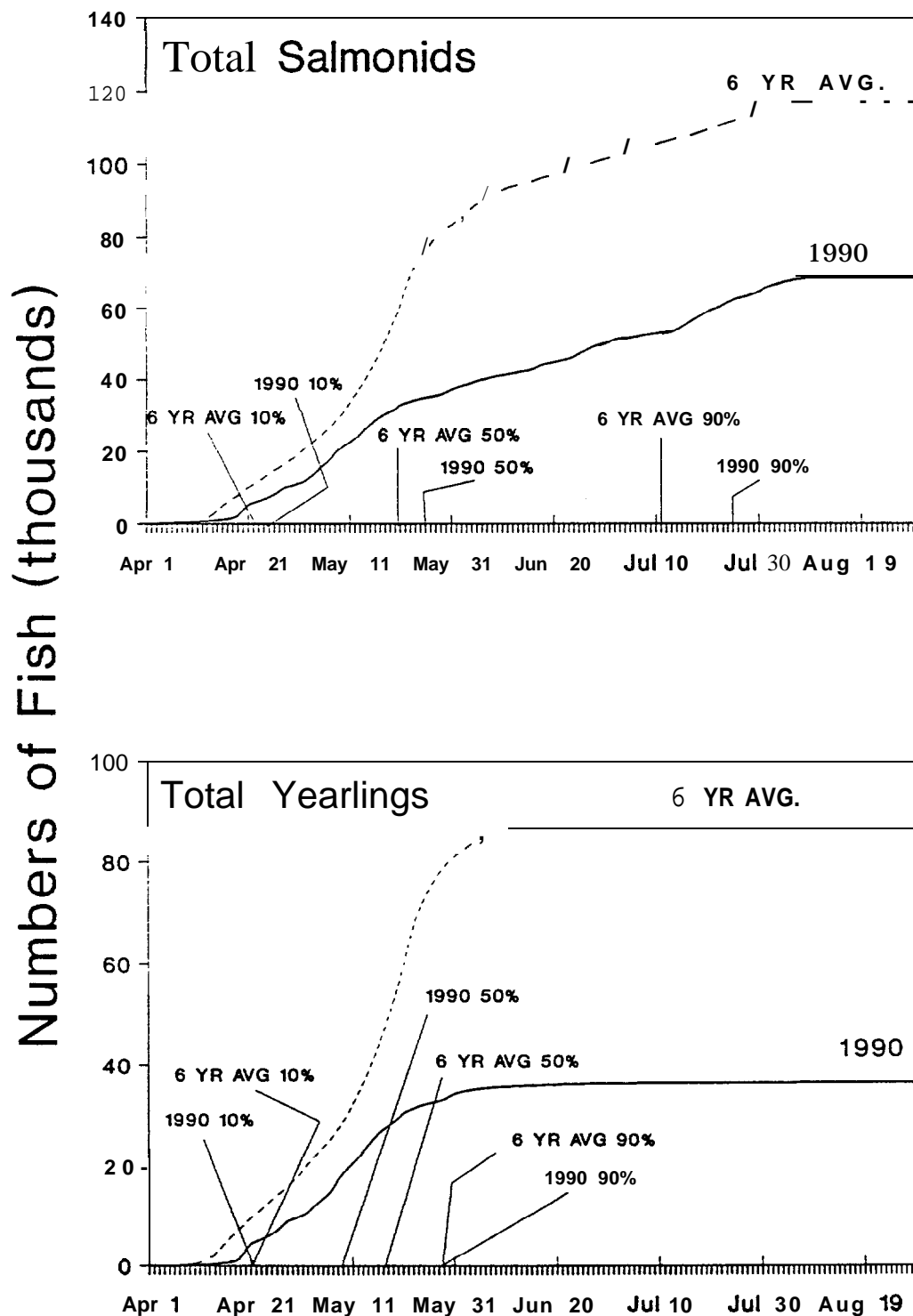


Figure 9. Comparison of cumulative total juvenile salmonid (total salmonid) passage at Rock Island Dam between 1990 and the six year average and a comparison of the cumulative juvenile migration excluding sub-yearling chinook (total yearlings) for 1990 and the six year average.

These fish enter the Columbia River 15 miles above Rock Island Dam and, as a result, Columbia River flows had less influence on travel time to Rock Island Dam for these groups compared to fish released above Rocky Reach Dam.

#### **Accelerated growth sub-yearling chinook**

Four groups of accelerated growth chinook sub-yearlings were released from the Leavenworth hatchery on 4 May. Median travel times for all 4 groups was 2 days, and the bypass trap collected between 1.07 to 1.29% of these fish (Table 1).

### **Winthrop National Fish Hatchery**

#### **Yearling chinook**

Three groups of yearling chinook were released into the Methow River on 17 April (Table 1). The median passage times for two of the groups (1 group only had 1 fish recovered) of fish were 27 and 29 days. The fish released into the Methow River traveled a longer distance before reaching Rock Island Dam than did the fish released into the Wenatchee River. The Rock Island Dam bypass trap sampled 0.03- 0.05% of these released fish (Table 1).

### **Entiat National Fish Hatchery**

#### **Yearling chinook**

Two groups of yearling chinook were released into the Entiat River on 19 April. The median passage date for these groups were 5 days (Table 1). We sampled 0.15 and 0.20% of these two groups (Table 1.)

### **Wells Dam Fish Hatchery (WDF and WDW)**

#### **Sub-yearling chinook**

Two groups of branded sub-yearling chinook were released from Wells Dam on 25 May. The median travel time to Rock Island Dam for these groups were 30 and 32 days and the bypass trap collected 0.14 and 0.20% of the marked fish from this release (Table 1). These fish had a shorter travel distance than the yearling chinook released in the Methow River.

#### **Steelhead**

Marked steelhead were released on 24 April into the Methow and Similkameen rivers (Table 1). Median travel times of the two groups of fish released in the Similkameen River were 17 days. The median travel times for the two groups of steelhead released into the Methow River were 16 days (Table 1). Steelhead migrated downstream faster than did chinook yearlings traveling approximately the same distance. Of the branded steelhead released, recoveries ranged from 0.48 to 0.94% at the Rock Island Dam bypass trap (Table 1).



## SUMMARY

Between 1 April and 31 **August**, 1990, 69,475 downstream migrating **salmonids** were collected at the Rock Island Dam bypass trap. Freeze branded fish collected consisted of 2,053 chinook salmon and 514 **steelhead** trout. In **addition**, 3,250 chinook and 8,804 steelhead were collected that had clipped adipose fins.

The middle 80% of the **salmonid outmigration** passed Rock Island Dam between 25 April and 26 July, 1990, a 92 day period. The dates and duration of the **outmigration** were extended by sub-yearling chinook. If sub-yearling chinook are excluded from analysis, the middle **80%** of the **outmigration** was 21 **April** to 29 May, a 38 day period. Sub-yearling chinook comprised 47% of the **fish** collected at Rock Island Dam.

## ACKNOWLEDGMENTS

This monitoring effort was funded by the **Bonneville** Power Administration U.S. Department of Energy, as a part of the Northwest Power Planning Council's program to **protect**, mitigate, and enhance fish and wildlife affected by hydroelectric facilities in the Columbia River Basin. The study was coordinated through the Fish Passage Center. Dave Marvin and Larry **Basham** of the FPC were **very** helpful throughout the study. Dave Marvin of **FPC** assisted in the PIT tagging program. The Public Utility District No. 1 of **Chelan** County conducted the smelt monitoring at Rock Island Dam and a number of **District** employees assisted with the study. Dick **Nason**, Steve Hays, and Paul Fielder provided administrative and logistical help as well as information and advise. The following individuals assisted with the trap monitoring and data **input** into the computer: B. **Keese**, E. **Gocke**, R. McDonald, and K. Truscott.

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## **Appendix A**

**Daily salmonid catch, Rock Island Dam bypass trap, 1 April -31 August**

Appendix A-1. Daily **salmonid** catch, Rock Island bypass trap, April, 1990.

| DATE      | CHINOOK  | CHINOOK | <u>STEELHEAD</u> |          | TOTAL  | COHO | SOCKSYE | TOTAL     | TOTAL    |
|-----------|----------|---------|------------------|----------|--------|------|---------|-----------|----------|
|           | YEARLING | SUBYEAR | WILD             | HATCHERY | STLHD. |      |         | SALMON ID | YEARLING |
| 01-Apr-90 | 1        | 4       | 4                | 0        | 4      | 1    | 0       | 10        | 6        |
| 02-Apr-90 | 1        | 44      | 0                | 0        | 0      | 0    | 0       | 45        | 1        |
| 03-Apr-90 | 2        | 48      | 6                | 0        | 6      | 0    | 0       | 56        | 8        |
| 04-Apr-90 | 6        | 62      | 6                | 0        | 6      | 0    | 0       | 74        | 12       |
| 05-Apr-90 | 18       | 45      | 4                | 0        | 4      | 0    | 1       | 68        | 23       |
| 06-Apr-90 | 13       | 19      | 7                | 3        | 10     | 0    | 1       | 43        | 24       |
| 07-Apr-90 | 19       | 44      | 4                | 0        | 4      | 0    | 1       | 68        | 24       |
| 08-Apr-90 | 20       | 77      | 5                | 0        | 5      | 0    | 0       | 102       | 25       |
| 09-Apr-90 | 7        | 66      | 14               | 1        | 15     | 0    | 2       | 90        | 24       |
| 10-Apr-90 | 33       | 36      | 15               | 2        | 17     | 0    | 17      | 103       | 67       |
| 11-Apr-90 | 14       | 29      | 7                | 0        | 7      | 0    | 11      | 61        | 32       |
| 12-Apr-90 | 17       | 59      | 6                | 4        | 10     | 0    | 7       | 93        | 34       |
| 13-Apr-90 | 12       | 45      | 6                | 24       | 30     | 0    | 2       | 89        | 44       |
| 14-Apr-90 | 16       | 24      | 12               | 23       | 35     | 0    | 35      | 110       | 86       |
| 15-Apr-90 | 30       | 26      | 21               | 30       | 51     | 0    | 70      | 177       | 151      |
| 16-Apr-90 | 29       | 21      | 9                | 49       | 58     | 0    | 50      | 158       | 137      |
| 17-Apr-90 | 30       | 37      | 15               | 24       | 39     | 0    | 65      | 171       | 134      |
| 18-Apr-90 | 31       | 58      | 28               | 50       | 78     | 0    | 27      | 194       | 136      |
| 19-Apr-90 | 439      | 39      | 13               | 57       | 70     | 0    | 58      | 606       | 567      |
| 20-Apr-90 | 1,643    | 13      | 37               | 66       | 103    | 0    | 72      | 1,831     | 1,818    |
| 21-Apr-90 | 978      | 149     | 29               | 52       | 81     | 0    | 75      | 1,283     | 1,134    |
| 22-Apr-90 | 317      | 115     | 18               | 32       | 50     | 0    | 66      | 548       | 433      |
| 23-Apr-90 | 215      | 18      | 33               | 37       | 70     | 0    | 129     | 432       | 414      |
| 24-Apr-90 | 346      | 22      | 33               | 48       | 81     | 0    | 65      | 514       | 492      |
| 25-Apr-90 | 316      | 12      | 29               | 104      | 133    | 0    | 78      | 539       | 527      |
| 26-Apr-90 | 386      | 17      | 31               | 132      | 163    | 0    | 115     | 681       | 664      |
| 27-Apr-90 | 545      | 12      | 43               | 157      | 200    | 0    | 174     | 931       | 919      |
| 28-Apr-90 | 746      | 11      | 50               | 161      | 211    | 0    | 61      | 1,029     | 1,018    |
| 29-Apr-90 | 190      | 1       | 13               | 67       | 80     | 0    | 57      | 328       | 327      |
| 30-Apr-90 | 236      | 14      | 12               | 86       | 98     | 0    | 38      | 386       | 372      |
| TOTALS :  | 6,656    | 1,167   | 510              | 1,209    | 1,719  | 1    | 1,277   | 10,820    | 9,653    |

Appendix A-2. Daily **salmonid** catch, Rock Island bypass trap, May, 1990.

| DATE             | CHINOOK      | CHINOOK    | <u>STEELHEAD</u> |              | TOTAL      | COHO         | SCKEYE    | TOTAL    | TOTAL        |
|------------------|--------------|------------|------------------|--------------|------------|--------------|-----------|----------|--------------|
|                  | YEARLING     | SUBYEAR    | WILD             | HATCHERY     | STLHD.     |              |           | SALMONID | YEARLING     |
| 01-May-90        | <b>281</b>   | 6          | 19               | <b>105</b>   | 124        | 0            | <b>53</b> | 464      | 458          |
| 02-May-90        | 329          | 5          | 26               | <b>85</b>    | <b>111</b> | 0            | <b>30</b> | 475      | 470          |
| 03-May-90        | 503          | 13         | 36               | <b>195</b>   | 231        | 279          | <b>58</b> | 1,084    | 1,071        |
| 04-May-90        | 475          | 6          | 32               | 187          | 219        | 214          | <b>69</b> | 983      | 977          |
| 05-May-90        | 498          | 684        | 40               | 202          | 242        | 80           | <b>55</b> | 1,559    | 875          |
| 06-May-90        | 394          | <b>254</b> | 35               | 225          | 260        | 104          | <b>15</b> | 1,027    | 773          |
| 07-May-90        | <b>471</b>   | <b>74</b>  | 44               | 339          | 383        | 200          | 61        | 1,189    | <b>1,115</b> |
| 08-May-90        | 536          | 46         | 48               | 533          | 581        | 624          | 116       | 1,903    | 1,857        |
| 09-May-90        | 323          | 13         | 50               | 513          | 563        | 254          | 55        | 1,208    | 1,195        |
| 10-May-90        | <b>162</b>   | 2          | 81               | 542          | 623        | 215          | 19        | 1,021    | <b>1,019</b> |
| 11-May-90        | <b>162</b>   | 13         | 78               | 483          | 561        | 242          | 16        | 994      | 981          |
| 12-May-90        | 182          | 13         | 53               | 384          | 437        | 263          | 23        | 918      | 905          |
| 13-May-90        | 218          | 13         | <b>46</b>        | 548          | 594        | 402          | 50        | 1,277    | 1,264        |
| 14-May-90        | 249          | 22         | <b>51</b>        | 608          | 659        | 490          | 21        | 1,441    | 1,419        |
| 15-May-90        | 264          | 13         | 56               | 418          | 474        | 402          | 24        | 1,177    | 1,164        |
| 16-May-90        | 250          | 6          | <b>45</b>        | 341          | 386        | 546          | 8         | 1,196    | 1,190        |
| 17-May-90        | 152          | 10         | 45               | 269          | 314        | 389          | 10        | 875      | 865          |
| 18-May-90        | 95           | 13         | 46               | 176          | 222        | 421          | 13        | 764      | 751          |
| 19-May-90        | 49           | 5          | 28               | 102          | 130        | 459          | 53        | 696      | 691          |
| 20-May-90        | 43           | <b>7</b>   | 26               | <b>57</b>    | 83         | 481          | 36        | 650      | 643          |
| 21-May-90        | 49           | 23         | 38               | 63           | <b>101</b> | <b>1,074</b> | <b>31</b> | 1,278    | 1,255        |
| 22-May-90        | 42           | 4          | 35               | 52           | 87         | 309          | 12        | 454      | 450          |
| 23-May-90        | <b>22</b>    | 13         | 39               | 55           | 94         | 281          | 37        | 447      | 434          |
| <b>24-May-90</b> | <b>16</b>    | 14         | 35               | 53           | 88         | 283          | 40        | 441      | 427          |
| 25-May-90        | <b>13</b>    | 26         | 33               | <b>31</b>    | 64         | 290          | 13        | 406      | 380          |
| 26-May-90        | <b>4</b>     | 16         | 18               | 16           | 34         | 177          | 9         | 240      | 224          |
| 27-May-90        | <b>6</b>     | 19         | 28               | 24           | 52         | <b>190</b>   | 2         | 269      | 250          |
| 28-May-90        | <b>16</b>    | 31         | 24               | 30           | 54         | 120          | <b>15</b> | 236      | 205          |
| 29-May-90        | <b>13</b>    | 30         | 46               | 39           | 85         | 225          | 20        | 373      | 343          |
| 30-May-90        | <b>39</b>    | 84         | 65               | 48           | <b>113</b> | 305          | 58        | 599      | 515          |
| 31-May-90        | <b>68</b>    | 143        | 107              | 118          | 225        | 181          | 70        | 687      | 544          |
| TOTALS :         | <b>5,924</b> | 1,621      | <b>1,353</b>     | <b>6,841</b> | 8,194      | 9,500        | 1,092     | 26,331   | 24,710       |

Appendix A-3. Daily **salmonid** catch, Rock Island bypass trap, June, 1990.

| DATE      | CHINOOK  | CHINOOK | <u>STEELHEAD</u> |          | TOTAL  | COHO | SOCKEYE | TOTAL     | TOTAL    |
|-----------|----------|---------|------------------|----------|--------|------|---------|-----------|----------|
|           | YEARLING | SUBYEAR | WUD              | HATCHERY | STLHD. |      |         | SALMON ID | YEARLING |
| 01-Jun-90 | 62       | 216     | 72               | 83       | 155    | 124  | 32      | 589       | 373      |
| 02-Jun-90 | 63       | 272     | 67               | 53       | 120    | 37   | 18      | 510       | 238      |
| 03-Jun-90 | 34       | 211     | 33               | 26       | 59     | 49   | 23      | 376       | 165      |
| 04-Jun-90 | 40       | 239     | 29               | 31       | 60     | 47   | 18      | 404       | 165      |
| 05-Jun-90 | 20       | 438     | 31               | 31       | 62     | 52   | 15      | 587       | 149      |
| 06-Jun-90 | 24       | 257     | 26               | 21       | 47     | 38   | 16      | 382       | 125      |
| 07-Jun-90 | 8        | 212     | 10               | 16       | 26     | 19   | 12      | 277       | 65       |
| 08-Jun-90 | 16       | 406     | 10               | 20       | 30     | 54   | 25      | 531       | 125      |
| 09-Jun-90 | 9        | 237     | 8                | 8        | 16     | 18   | 1       | 281       | 44       |
| 10-Jun-90 | 14       | 157     | 9                | 13       | 22     | 14   | 4       | 211       | 54       |
| 11-Jun-90 | 6        | 196     | 11               | 39       | 50     | 7    | 2       | 261       | 65       |
| 12-Jun-90 | 0        | 224     | 11               | 20       | 31     | 15   | 5       | 275       | 51       |
| 13-Jun-90 | 2        | 287     | 10               | 10       | 20     | 10   | 4       | 323       | 36       |
| 14-Jun-90 | 4        | 192     | 4                | 21       | 2s     | 6    | 5       | 232       | 40       |
| 15-Jun-90 | 4        | 213     | 7                | 23       | 30     | 7    | 6       | 260       | 47       |
| 16-Jun-90 | 1        | 306     | 5                | 14       | 19     | 0    | 3       | 329       | 23       |
| 17-Jun-90 | 6        | 735     | 2                | 9        | 11     | 0    | 8       | 760       | 25       |
| 18-Jun-90 | 4        | 611     | 10               | 13       | 23     | 0    | 3       | 641       | 30       |
| 19-Jun-90 | 1        | 243     | 8                | 17       | 25     | 1    | 4       | 274       | 31       |
| 20-Jun-90 | 1        | 233     | 5                | 17       | 22     | 0    | 2       | 258       | 25       |
| 21-Jun-90 | 1        | 280     | 5                | 32       | 37     | 0    | 3       | 321       | 41       |
| 22-Jun-90 | 0        | 351     | 1                | 28       | 29     | 0    | 5       | 385       | 34       |
| 23-Jun-90 | 0        | 283     | 3                | 16       | 19     | 0    | 3       | 305       | 22       |
| 24-Jun-90 | 0        | 479     | 1                | 14       | 15     | 0    | 1       | 495       | 16       |
| 25-Jun-90 | 1        | 906     | 0                | 27       | 27     | 0    | 3       | 937       | 31       |
| 26-Jun-90 | 0        | 665     | 1                | 19       | 20     | 0    | 1       | 686       | 21       |
| 27-Jun-90 | 0        | 652     | 5                | 5        | 10     | 0    | 5       | 667       | 15       |
| 28-Jun-90 | 0        | 708     | 0                | 16       | 16     | 0    | 4       | 728       | 20       |
| 29-Jun-90 | 0        | 393     | 1                | 7        | 8      | 0    | 2       | 403       | 10       |
| 30-Jun-90 | 0        | 218     | 2                | 5        | 7      | 0    | 0       | 225       | 7        |
| TOTALS:   | 321      | 10,820  | 387              | 654      | 1,041  | 498  | 233     | 12,913    | 2,093    |

Appendix A-4. Daily **salmonid** catch, Rock Island bypass trap, July, 1990.

| DATE      | CHINOOK  | CHINOOK | <u>STEELHEAD</u> |          | TOTAL  | COHO | SOCKEYE | TOTAL    | TOTAL    |
|-----------|----------|---------|------------------|----------|--------|------|---------|----------|----------|
|           | YEARLING | SUBYEAS | WILD             | HATCHERY | STLHD. |      |         | SALMONID | YEARLING |
| 01-Jul-90 | 0        | 397     | 1                | 5        | 6      | 0    | 2       | 405      | 8        |
| 02-Jul-90 | 0        | 662     | 2                | 4        | 6      | 0    | 5       | 673      | 11       |
| 03-Jul-90 | 0        | 275     | 2                | 10       | 12     | 0    | 1       | 288      | 13       |
| 04-Jul-90 | 0        | 71      | 1                | 0        | 1      | 0    | 0       | 72       | 1        |
| 05-Jul-90 | 0        | 84      | 1                | 7        | 8      | 0    | 0       | 92       | 8        |
| 06-Jul-90 | 0        | 261     | 2                | 4        | 6      | 0    | 1       | 268      | 7        |
| 07-Jul-90 | 0        | 285     | 0                | 1        | 1      | 0    | 0       | 286      | 1        |
| 08-Jul-90 | 0        | 354     | 0                | 6        | 6      | 0    | 1       | 361      | 7        |
| 09-Jul-90 | 0        | 180     | 1                | 2        | 3      | 0    | 1       | 184      | 4        |
| 10-Jul-90 | 0        | 216     | 0                | 1        | 1      | 0    | 0       | 217      | 1        |
| 11-Jul-90 | 0        | 157     | 0                | 2        | 2      | 0    | 2       | 161      | 4        |
| 12-Jul-90 | 0        | 129     | 1                | 0        | 1      | 0    | 0       | 130      | 1        |
| 13-Jul-90 | 0        | 148     | 3                | 0        | 3      | 0    | 1       | 152      | 4        |
| 14-Jul-90 | 0        | 478     | 0                | 2        | 2      | 0    | 2       | 482      | 4        |
| 15-Jul-90 | 0        | 813     | 1                | 2        | 3      | 0    | 1       | 817      | 4        |
| 16-Jul-90 | 0        | 1,022   | 2                | 0        | 2      | 0    | 2       | 1,026    | 4        |
| 17-Jul-90 | 0        | 917     | 1                | 1        | 2      | 0    | 0       | 919      | 2        |
| 18-Jul-90 | 0        | 909     | 3                | 1        | 4      | 0    | 0       | 913      | 4        |
| 19-Jul-90 | 0        | 802     | 1                | 0        | 1      | 0    | 1       | 804      | 2        |
| 20-Jul-90 | 1        | 906     | 4                | 1        | 5      | 0    | 0       | 912      | 6        |
| 21-Jul-90 | 0        | 602     | 1                | 0        | 1      | 0    | 1       | 604      | 2        |
| 22-Jul-90 | 1        | 519     | 0                | 0        | 0      | 0    | 0       | 520      | 1        |
| 23-Jul-90 | 0        | 664     | 2                | 2        | 4      | 0    | 2       | 670      | 6        |
| 24-Jul-90 | 0        | 751     | 3                | 0        | 3      | 0    | 1       | 755      | 4        |
| 25-Jul-90 | 0        | 661     | 1                | 1        | 2      | 0    | 1       | 664      | 3        |
| 26-Jul-90 | 0        | 486     | 0                | 0        | 0      | 0    | 0       | 486      | 0        |
| 27-Jul-90 | 0        | 328     | 3                | 3        | 6      | 0    | 1       | 335      | 7        |
| 28-Jul-90 | 0        | 308     | 1                | 2        | 3      | 0    | 0       | 311      | 3        |
| 29-Jul-90 | 0        | 502     | 0                | 3        | 3      | 0    | 1       | 506      | 4        |
| 30-Jul-90 | 0        | 400     | 0                | 1        | 1      | 0    | 2       | 403      | 3        |
| 31-Jul-90 | 0        | 870     | 3                | 4        | 7      | 0    | 3       | 880      | 10       |
| TOTALS:   | 2        | 15,157  | 40               | 65       | 105    | 0    | 32      | 15,296   | 139      |

Appendix A-5. Daily **salmonid** catch, Rock Island bypass trap, August, 1990.

| DATE      | CHINOOK  | CHINOOK | STEELHEAD |          | TOTAL  | COHO | SOCKEYE | TOTAL    | TOTAL    |
|-----------|----------|---------|-----------|----------|--------|------|---------|----------|----------|
|           | YEARLING | SUBYEAR | WILD      | HATCHERY | STLHD. |      |         | SALMONID | YEARLING |
| 01-Aug-90 | 0        | 691     | 1         | 3        | 4      | 0    | 2       | 697      | 6        |
| 02-Aug-90 | 0        | 492     | 1         | 2        | 3      | 0    | 3       | 498      | 6        |
| 03-Aug-90 | 0        | 380     | 2         | 1        | 3      | 0    | 0       | 383      | 3        |
| 04-Aug-90 | 0        | 414     | 2         | 1        | 3      | 0    | 1       | 418      | 4        |
| 05-Aug-90 | 0        | 321     | 1         | 0        | 1      | 0    | 1       | 323      | 2        |
| 06-Aug-90 | 1        | 286     | 0         | 0        | 0      | 0    | 2       | 289      | 3        |
| 07-Aug-90 | 0        | 199     | 0         | 0        | 0      | 0    | 2       | 201      | 2        |
| 08-Aug-90 | 0        | 196     | 2         | 2        | 4      | 0    | 1       | 201      | 5        |
| 09-Aug-90 | 0        | 95      | 0         | 0        | 0      | 0    | 0       | 95       | 0        |
| 10-Aug-90 | 0        | 55      | 1         | 1        | 2      | 0    | 0       | 57       | 2        |
| 11-Aug-90 | 0        | 85      | 0         | 1        | 1      | 0    | 0       | 86       | 1        |
| 12-Aug-90 | 0        | 65      | 0         | 0        | 0      | 0    | 0       | 65       | 0        |
| 13-Aug-90 | 0        | 68      | 0         | 0        | 0      | 0    | 1       | 69       | 1        |
| 14-Aug-90 | 0        | 51      | 0         | 0        | 0      | 0    | 0       | 51       | 0        |
| 15-Aug-90 | 1        | 96      | 0         | 0        | 0      | 0    | 0       | 97       | 1        |
| 16-Aug-90 | 0        | 28      | 1         | 0        | 1      | 0    | 0       | 29       | 1        |
| 17-Aug-90 | 0        | 49      | 0         | 0        | 0      | 0    | 2       | 51       | 2        |
| 18-Aug-90 | 0        | 39      | 0         | 0        | 0      | 0    | 4       | 43       | 4        |
| 19-Aug-90 | 0        | 26      | 0         | 0        | 0      | 0    | 0       | 26       | 0        |
| 20-Aug-90 | 0        | 25      | 0         | 0        | 0      | 0    | 6       | 31       | 6        |
| 21-Aug-90 | 0        | 16      | 0         | 0        | 0      | 0    | 3       | 19       | 3        |
| 22-Aug-90 | 0        | 116     | 0         | 0        | 0      | 0    | 3       | 119      | 3        |
| 23-Aug-90 | 0        | 105     | 6         | 0        | 6      | 0    | 2       | 113      | 8        |
| 24-Aug-90 | 0        | 63      | 2         | 0        | 2      | 0    | 0       | 65       | 2        |
| 25-Aug-90 | 0        | 32      | 0         | 0        | 0      | 0    | 2       | 34       | 2        |
| 26-Aug-90 | 0        | 15      | 2         | 0        | 2      | 0    | 1       | 18       | 3        |
| 27-Aug-90 | 0        | 17      | 0         | 0        | 0      | 0    | 2       | 19       | 2        |
| 28-Aug-90 | 0        | 4       | 0         | 0        | 0      | 0    | 1       | 5        | 1        |
| 29-Aug-90 | 0        | 5       | 2         | 0        | 2      | 0    | 0       | 7        | 2        |
| 30-Aug-90 | 0        | 1       | 0         | 2        | 2      | 0    | 0       | 3        | 2        |
| 31-Aug-90 | 0        | 3       | 0         | 0        | 0      | 0    | 0       | 3        | 0        |
| TOTALS:   | 2        | 4,038   | 23        | 13       | 36     | 0    | 39      | 4,115    | 77       |



Appendix A-6. Monthly summary of the Rock Island bypass catch, 1 April -31 August, 1990.

| MONTH         | CHINOOK  | cHINOOK      | <u>STEELHEAD</u> |              | TOTAL  | COHO         | SOCKEYE   | TOTAL     | TOTAL    |
|---------------|----------|--------------|------------------|--------------|--------|--------------|-----------|-----------|----------|
|               | YEARLING | SUBYEAS      | WILD             | HATCHERY     | STLHD. |              |           | SALMON ID | YEARLING |
| April         | 6,656    | <b>1,167</b> | 510              | <b>1,209</b> | 1,719  | 1            | 1,277     | 10,820    | 9,653    |
| May           | 5,924    | 1,621        | 1,353            | 6,841        | 8,194  | <b>9,500</b> | 1,092     | 26,331    | 24,710   |
| June          | 321      | 10,820       | 387              | 654          | 1,041  | 498          | 233       | 12,913    | 2,093    |
| July          | 2        | 15,157       | <b>40</b>        | 65           | 105    | 0            | <b>32</b> | 15,296    | 139      |
| <b>August</b> | 2        | 4,038        | 23               | <b>13</b>    | 36     | 0            | 39        | 4,115     | 77       |
| TOTALS :      | 12,905   | 32,803       | 2,313            | 8,782        | 11,095 | 9,999        | 2,673     | 69,475    | 36,672   |

## **Appendix B**

**Expanded Rock Island Dam bypass trap counts, 1 April -31 August**

Appendix B-1. Expanded Rock Island bypass trap counts, April, 1990.

| DATE      | CHINOOK  | CHINOOK | <u>STEELHEAD</u> |          | TOTAL  |      |         |           | TOTAL    | TOT N |
|-----------|----------|---------|------------------|----------|--------|------|---------|-----------|----------|-------|
|           | YEARLING | SUBYEAR | WILD             | HATCHERY | STLHD. | COHO | SOCKEYE | SALMON ID | YEARLING |       |
| 01-Apr-90 | 1        | 6       | 6                | 0        | 6      | 1    | 0       | 14        | 8        |       |
| 02-Apr-90 | 2        | 68      | 0                | 0        | 0      | 0    | 0       | 70        | 2        |       |
| 03-Apr-90 | 3        | 81      | 10               | 0        | 10     | 0    | 0       | 94        | 13       |       |
| 04-Apr-90 | 9        | 95      | 9                | 0        | 9      | 0    | 0       | 113       | 18       |       |
| 05-Apr-90 | 26       | 65      | 6                | 0        | 6      | 0    | 1       | 98        | 33       |       |
| 06-Apr-90 | 18       | 26      | 10               | 4        | 14     | 0    | 1       | 59        | 33       |       |
| 07-Apr-90 | 29       | 66      | 6                | 0        | 6      | 0    | 2       | 103       | 37       |       |
| 08-Apr-90 | 33       | 128     | 8                | 0        | 8      | 0    | 0       | 169       | 41       |       |
| 09-Apr-90 | 10       | 97      | 21               | 1        | 22     | 0    | 3       | 132       | 35       |       |
| 10-Apr-90 | 50       | 54      | 23               | 3        | 26     | 0    | 26      | 156       | 102      |       |
| 11-Apr-90 | 21       | 43      | 10               | 0        | 10     | 0    | 16      | 90        | 47       |       |
| 12-Apr-90 | 25       | 87      | 9                | 6        | 15     | 0    | 10      | 137       | 50       |       |
| 13-Apr-90 | 18       | 68      | 9                | 36       | 45     | 0    | 3       | 134       | 66       |       |
| 14-Apr-90 | 23       | 34      | 17               | 33       | 50     | 0    | 49      | 156       | 122      |       |
| 15-Apr-90 | 37       | 32      | 26               | 37       | 63     | 0    | 85      | 217       | 185      |       |
| 16-Apr-90 | 33       | 24      | 10               | 56       | 66     | 0    | 57      | 180       | 156      |       |
| 17-Apr-90 | 45       | 55      | 22               | 36       | 58     | 0    | 97      | 285       | 200      |       |
| 18-Apr-90 | 45       | 85      | 41               | 73       | 114    | 0    | 39      | 283       | 198      |       |
| 19-Apr-90 | 663      | 59      | 20               | 86       | 106    | 0    | 88      | 916       | 857      |       |
| 20-Apr-90 | 2,683    | 21      | 60               | 108      | 168    | 0    | 118     | 2,990     | 2,969    |       |
| 21-Apr-90 | 1,438    | 219     | 43               | 76       | 119    | 0    | 110     | 1,886     | 1,667    |       |
| 22-Apr-90 | 545      | 198     | 31               | 55       | 86     | 0    | 113     | 942       | 744      |       |
| 23-Apr-90 | 299      | 25      | 46               | 51       | 97     | 0    | 179     | 600       | 575      |       |
| 24-Apr-90 | 555      | 35      | 53               | 77       | 130    | 0    | 104     | 824       | 789      |       |
| 25-Apr-90 | 544      | 21      | 50               | 179      | 229    | 0    | 134     | 928       | 907      |       |
| 26-Apr-90 | 656      | 29      | 53               | 224      | 277    | 0    | 195     | 1,157     | 1,128    |       |
| 27-Apr-90 | 953      | 21      | 75               | 274      | 349    | 0    | 304     | 1,627     | 1,606    |       |
| 28-Apr-90 | 1,270    | 19      | 85               | 274      | 359    | 0    | 104     | 1,752     | 1,733    |       |
| 29-Apr-90 | 328      | ?       | 22               | 116      | 138    | 0    | 99      | 567       | 565      |       |
| 30-Apr-90 | 372      | 22      | 19               | 136      | 155    | 0    | 60      | 609       | 587      |       |
| TOTALS:   | 10,734   | 1,785   | 800              | 1,941    | 2,741  | 1    | 1,997   | 17,258    | 15,473   |       |

Appendix B-2. Expanded Rock Island bypass trap counts, May, 1990.

| DATE             | CHINOOK   | CHINOOK    | STEELHEAD |            | TOTAL         | COHO         | SOCKEYE    | TOTAL        | TOTAL        |
|------------------|-----------|------------|-----------|------------|---------------|--------------|------------|--------------|--------------|
|                  | YEARLING  | s U B -    | WILD      | HATCHERY   | STLHD.        |              |            | SALMON ID    | YEARLING     |
| 01-May-90        | 506       | 11         | 34        | <b>189</b> | 223           | <b>0</b>     | 95         | 835          | 824          |
| 02-May-90        | 564       | 9          | 45        | 146        | 191           | <b>0</b>     | <b>51</b>  | 815          | 806          |
| 03-May-90        | 844       | 22         | 60        | 327        | 387           | 468          | 97         | 1,818        | 1,796        |
| 04-May-90        | 739       | 9          | 50        | 291        | 341           | 333          | <b>107</b> | 1,529        | 1,520        |
| 05-May-90        | 751       | 1,032      | 60        | 305        | 365           | 121          | 83         | 2,352        | <b>1,320</b> |
| 06-May-90        | 635       | 409        | 56        | 363        | 419           | <b>168</b>   | 24         | 1,655        | 1,246        |
| 07-May-90        | 719       | <b>113</b> | 67        | 518        | 585           | 305          | 93         | <b>1,815</b> | 1,702        |
| 08-May-90        | 952       | 82         | 85        | 947        | 1,032         | 1,109        | 206        | 3,381        | 3,299        |
| 09-May-90        | 583       | 23         | 90        | 926        | 1,016         | 459          | 99         | 2,180        | 2,157        |
| 10-May-90        | 279       | 3          | 140       | 935        | 1,075         | 371          | 33         | 1,761        | 1,758        |
| <b>11-May-90</b> | 289       | 23         | 139       | 861        | <b>1,000</b>  | 431          | 29         | <b>1,772</b> | 1,749        |
| 12-May-90        | 296       | 21         | 86        | 625        | 711           | 428          | 37         | 1,493        | <b>1,472</b> |
| 13-May-90        | 306       | 18         | 65        | 769        | 834           | 564          | 70         | 1,792        | 1,774        |
| 14-May-90        | 333       | 29         | 68        | 814        | 882           | 656          | 28         | 1,928        | 1,899        |
| 15-May-90        | 4C9       | 20         | 87        | 648        | 735           | 623          | 37         | <b>1,824</b> | 1,804        |
| 16-May-90        | 375       | 9          | 68        | 512        | 580           | 819          | 12         | 1,795        | 1,796        |
| 17-May-90        | 240       | <b>16</b>  | 71        | 424        | 495           | <b>613</b>   | 16         | 1,380        | 1,364        |
| 18-May-90        | 154       | 21         | 74        | 284        | 358           | 680          | 21         | <b>1,234</b> | 1,213        |
| 19-May-90        | 81        | 8          | 46        | 169        | 215           | 761          | 88         | 1,153        | <b>1,145</b> |
| 20-May-90        | 69        | <b>11</b>  | 42        | 91         | 133           | 768          | 58         | 1,039        | 1,028        |
| 21-May-90        | 70        | 33         | 54        | 89         | 143           | <b>1,525</b> | 44         | <b>1,815</b> | <b>1,782</b> |
| 22-May-90        | 64        | 6          | 53        | 79         | 132           | 469          | 18         | 689          | 683          |
| 23-May-90        | 36        | 21         | 63        | 90         | 153           | 458          | 60         | 728          | 707          |
| 24-May-90        | 27        | 24         | 59        | 90         | 149           | 480          | 68         | 748          | 725          |
| 25-May-90        | 20        | 40         | 51        | 48         | 99            | 450          | 20         | 629          | 589          |
| 26-May-90        | 6         | 24         | 27        | 24         | 51            | 265          | 13         | 359          | 335          |
| 27-May-90        | 7         | 21         | 32        | 27         | 59            | 214          | 2          | 303          | 282          |
| 28-May-90        | 20        | 38         | 29        | 37         | 66            | 147          | <b>18</b>  | 289          | <b>251</b>   |
| 29-May-90        | <b>16</b> | 38         | 58        | 49         | 107           | 285          | 25         | 471          | 433          |
| 30-May-90        | 60        | 129        | 99        | 73         | <b>172</b>    | 467          | 89         | 917          | 788          |
| 31-May-90        | 107       | 225        | 169       | 186        | 355           | 285          | 110        | 1,082        | 857          |
| TOTALS :         | 9,557     | 2,488      | 2,127     | 10,936     | <b>13,063</b> | 14,722       | 1,751      | 41,581       | 39,093       |

Appendix B-3. Expanded Rock Island bypass trap counts, June, 1990.

| DATE      | CHINOOK  | CHINOOK | <u>STEELHEAD</u> |          | TOTAL  | TOTAL |         |          | TOTAL    |
|-----------|----------|---------|------------------|----------|--------|-------|---------|----------|----------|
|           | YEARLING | SUBYEAR | WILD             | HATCHERY | STLHD. | COHO  | SOCKEYE | SALMONID | YEARLING |
| 01-Jun-90 | 102      | 357     | 119              | 137      | 286    | 205   | 53      | 973      | 616      |
| 02-Jun-90 | 107      | 461     | 114              | 90       | 204    | 63    | 31      | 866      | 405      |
| 03-Jun-90 | 52       | 325     | 51               | 40       | 91     | 75    | 35      | 578      | 253      |
| 04-Jun-90 | 54       | 325     | 39               | 42       | 81     | 64    | 25      | 549      | 224      |
| 05-Jun-90 | 33       | 727     | 51               | 51       | 102    | 86    | 25      | 973      | 246      |
| 06-Jun-90 | 46       | 496     | 50               | 40       | 90     | 73    | 31      | 736      | 240      |
| 07-Jun-90 | 16       | 432     | 20               | 33       | 53     | 39    | 24      | 564      | 132      |
| 08-Jun-90 | 33       | 843     | 21               | 42       | 63     | 112   | 52      | 1,103    | 260      |
| 09-Jun-90 | 18       | 474     | 16               | 16       | 32     | 36    | 2       | 562      | 88       |
| 10-Jun-90 | 27       | 308     | 18               | 25       | 43     | 27    | 8       | 413      | 105      |
| 11-Jun-90 | 9        | 310     | 17               | 62       | 79     | 11    | 3       | 412      | 102      |
| 12-Jun-90 | 0        | 463     | 23               | 41       | 64     | 31    | 10      | 568      | 105      |
| 13-Jun-90 | 5        | 736     | 26               | 26       | 52     | 26    | 10      | 829      | 93       |
| 14-Jun-90 | 15       | 701     | 15               | 77       | 92     | 22    | 18      | 848      | 147      |
| 15-Jun-90 | 12       | 641     | 21               | 69       | 90     | 21    | 18      | 782      | 141      |
| 16-Jun-90 | 3        | 876     | 14               | 40       | 54     | 0     | 9       | 942      | 66       |
| 17-Jun-90 | 10       | 1,284   | 3                | 16       | 19     | 0     | 14      | 1,327    | 43       |
| 18-Jun-90 | 7        | 1,048   | 17               | 22       | 39     | 0     | 5       | 1,099    | 51       |
| 19-Jun-90 | 3        | 707     | 23               | 49       | 72     | 3     | 12      | 797      | 90       |
| 20-Jun-90 | 2        | 548     | 12               | 40       | 52     | 0     | 5       | 607      | 59       |
| 21-Jun-90 | 2        | 643     | 11               | 73       | 84     | 0     | 7       | 736      | 93       |
| 22-Jun-90 | 0        | 665     | 2                | 53       | 55     | 0     | 9       | 729      | 64       |
| 23-Jun-90 | 0        | 815     | 9                | 46       | 55     | 0     | 9       | 879      | 64       |
| 24-Jun-90 | 0        | 752     | 2                | 22       | 24     | 0     | 2       | 778      | 26       |
| 25-Jun-90 | 2        | 1,479   | 0                | 44       | 44     | 0     | 5       | 1,530    | 51       |
| 26-Jun-90 | 0        | 2,167   | 3                | 62       | 65     | 0     | 3       | 2,235    | 68       |
| 27-Jun-90 | 0        | 1,571   | 12               | 12       | 24     | 0     | 12      | 1,607    | 36       |
| 28-Jun-90 | 0        | 1,498   | 0                | 34       | 34     | 0     | 8       | 1,540    | 42       |
| 29-Jun-90 | 0        | 1,115   | 3                | 20       | 23     | 0     | 6       | 1,144    | 29       |
| 30-Jun-90 | 0        | 508     | 5                | 12       | 17     | 0     | 0       | 525      | 17       |
| TOTALS:   | 558      | 23,275  | 717              | 1,336    | 2,053  | 894   | 451     | 27,231   | 3,956    |

Appendix B-4. Expanded Rock Island bypass trap counts, July, 1990.

| DATE      | CHINOOK  | CHINOOK | STEELHEAD |          | TOTAL  | COHO | SOCKEYE | TOTAL    | TOTAL    |
|-----------|----------|---------|-----------|----------|--------|------|---------|----------|----------|
|           | YEARLING | SUBYEAR | WILD      | HATCHERY | sTLHD. |      |         | SALMONID | YEARLING |
| 01-Jul-90 | 0        | 665     | 2         | 8        | 10     | 0    | 3       | 678      | 13       |
| 02-Jul-90 | 0        | 1,128   | 3         | 7        | 10     | 0    | 9       | 1,147    | 19       |
| 03-Jul-90 | 0        | 681     | 5         | 25       | 30     | 0    | 2       | 713      | 32       |
| 04-Jul-90 | 0        | 152     | 2         | 0        | 2      | 0    | 0       | 154      | 2        |
| 05-Jul-90 | 0        | 245     | 3         | 20       | 23     | 0    | 0       | 268      | 23       |
| 06-Jul-90 | 0        | 460     | 4         | 7        | 11     | 0    | 2       | 473      | 13       |
| 07-Jul-90 | 0        | 615     | 0         | ·        | 2      | 0    | 0       | 617      | 2        |
| 08-Jul-90 | 0        | 565     | 0         | 10       | 10     | 0    | 2       | 577      | 12       |
| 09-Jul-90 | 0        | 307     | 2         | 3        | 5      | 0    | 2       | 314      | 7        |
| 10-Jul-90 | 0        | 468     | 0         | 2        | 2      | 0    | 0       | 470      | 2        |
| 11-Jul-90 | 0        | 339     | 0         | 4        | 4      | 0    | 4       | 347      | 8        |
| 12-Jul-90 | 0        | 374     | 3         | 0        | 3      | 0    | 0       | 377      | 3        |
| 13-Jul-90 | 0        | 361     | 7         | 0        | 7      | 0    | 2       | 370      | 9        |
| 14-Jul-90 | 0        | 748     | 0         | 3        | 3      | 0    | 3       | 754      | 6        |
| 15-Jul-90 | 0        | 1,049   | 1         | 3        | 4      | 0    | 1       | 1,054    | 5        |
| 16-Jul-90 | 0        | 1,300   | 3         | 0        | 3      | 0    | 3       | 1,306    | 6        |
| 17-Jul-90 | 0        | 1,299   | 1         | 1        | 2      | 0    | 0       | 1,301    | 2        |
| 18-Jul-90 | 0        | 1,134   | 4         | 1        | 5      | 0    | 0       | 1,139    | 5        |
| 19-Jul-90 | 0        | 1,023   | 1         | 0        | 1      | 0    | 1       | 1,025    | 2        |
| 20-Jul-90 | 1        | 1,212   | 5         | 1        | 6      | 0    | 0       | 1,219    | 7        |
| 21-Jul-90 | 0        | 768     | 1         | 0        | 1      | 0    | 1       | 770      | 2        |
| 22-Jul-90 | 1        | 611     | 0         | 0        | 0      | 0    | 0       | 612      | 1        |
| 23-Jul-90 | 0        | 797     | 2         | 2        | 4      | 0    | 2       | 803      | 6        |
| 24-Jul-90 | 0        | 1,013   | 1         | 0        | 4      | 0    | 1       | 1,018    | 5        |
| 25-Jul-90 | 0        | 818     | 1         | 1        | 2      | 0    | 1       | 821      | 3        |
| 26-Jul-90 | 0        | 606     | 0         | 0        | 0      | 0    | 0       | 606      | 0        |
| 27-Jul-90 | 0        | 384     | 4         | 4        | 8      | 0    | 1       | 393      | 9        |
| 28-Jul-90 | 0        | 363     | 1         | 2        | 3      | 0    | 0       | 366      | 3        |
| 29-Jul-90 | 0        | 591     | 0         | 4        | 4      | 0    | 1       | 596      | 5        |
| 30-Jul-90 | 0        | 468     | 0         | 1        | 1      | 0    | 2       | 471      | 3        |
| 31-Jul-90 | 0        | 1,153   | 4         | 5        | 9      | 0    | 4       | 1,166    | 13       |
| TOTALS:   | 2        |         | 63        | 116      | 179    | 0    | 47      | 21,925   | 228      |

Appendix B-5. Expanded Rock Island bypass trap counts, August, 1990.

| DATE      | CHINOOK  | cHINOOK | STEELHEAD |          | ToTAL  |      | TOTAL   |          | TOTAL    |
|-----------|----------|---------|-----------|----------|--------|------|---------|----------|----------|
|           | YEARLING | SUBYEAR | WILD      | HATCHERY | STLHD. | COHO | SOCKEYE | SALMONID | YEARLING |
| 01-Aug-90 | 0        | 906     | 1         | 4        | 5      | 0    | 3       | 914      | 8        |
| 02-Aug-90 | 0        | 766     | 2         | 3        | 5      | 0    | 5       | 776      | 10       |
| 03-Aug-90 | 0        | 571     | 3         | 2        | 5      | 0    | 0       | 576      | 5        |
| 04-Aug-90 | 0        | 561     | 3         | 1        | 4      | 0    | 1       | 566      | 5        |
| 05-Aug-90 | 0        | 403     | 1         | 0        | 1      | 0    | 1       | 405      | 2        |
| 06-Aug-90 | 1        | 343     | 0         | 0        | 0      | 0    | 2       | 346      | 3        |
| 07-Aug-90 | 0        | 255     | 0         | 0        | 0      | 0    | 3       | 258      | 3        |
| 08-Aug-90 | 0        | 258     | 3         | 3        | 6      | 0    | 1       | 265      | 7        |
| 09-Aug-90 | 0        | 123     | 0         | 0        | 0      | 0    | 0       | 123      | 0        |
| 10-Aug-90 | 0        | 67      | 1         | 1        | 2      | 0    | 0       | 69       | 2        |
| 11-Aug-90 | 0        | 105     | 0         | 1        | 1      | 0    | 0       | 106      | 1        |
| 12-Aug-90 | 0        | 75      | 0         | 0        | 0      | 0    | 0       | 75       | 0        |
| 13-Aug-90 | 0        | 76      | 0         | 0        | 0      | 0    | 1       | 77       | 1        |
| 14-Aug-90 | 0        | 63      | 0         | 0        | 0      | 0    | 0       | 63       | 0        |
| 15-Aug-90 | 1        | 127     | 0         | 0        | 0      | 0    | 0       | 128      | 1        |
| 16-Aug-90 | 0        | 36      | 1         | 0        | 1      | 0    | 0       | 37       | 1        |
| 17-Aug-90 | 0        | 58      | 0         | 0        | 0      | 0    | 2       | 60       | 2        |
| 18-Aug-90 | 0        | 49      | 0         | 0        | 0      | 0    | 5       | 54       | 5        |
| 19-Aug-90 | 0        | 31      | 0         | 0        | 0      | 0    | 0       | 31       | 0        |
| 20-Aug-90 | 0        | 28      | 0         | 0        | 0      | 0    | 7       | 35       | 7        |
| 21-Aug-90 | 0        | 20      | 0         | 0        | 0      | 0    | 4       | 24       | 4        |
| 22-Aug-90 | 0        | 168     | 0         | 0        | 0      | 0    | 4       | 172      | 4        |
| 23-Aug-90 | 0        | 156     | 9         | 0        | 9      | 0    | 3       | 168      | 12       |
| 24-Aug-90 | 0        | 85      | 3         | 0        | 3      | 0    | 0       | 88       | 3        |
| 25-Aug-90 | 0        | 43      | 0         | 0        | 0      | 0    | 3       | 46       | 3        |
| 26-Aug-90 | 0        | 20      | 3         | 0        | 3      | 0    | 1       | 24       | 4        |
| 27-Aug-90 | 0        | 22      | 0         | 0        | 0      | 0    | 3       | 25       | 3        |
| 28-Aug-90 | 0        | 7       | 0         | 0        | 0      | 0    | 2       | 9        | 2        |
| 29-Aug-90 | 0        | 8       | 3         | 0        | 3      | 0    | 0       | 11       | 3        |
| 30-Aug-90 | 0        | 1       | 0         | 2        | 2      | 0    | 0       | 3        | 2        |
| 31-Aug-90 | 0        | 4       | 0         | 0        | 0      | 0    | 0       | 4        | 0        |
| TOTALS:   | 2        | 5,435   | 33        | 17       | 50     | 0    | 51      | 5,538    | 103      |

Appendix B-6. Monthly summary of the expanded Rock Island bypass catch, 1 April - 31 August, 1990.

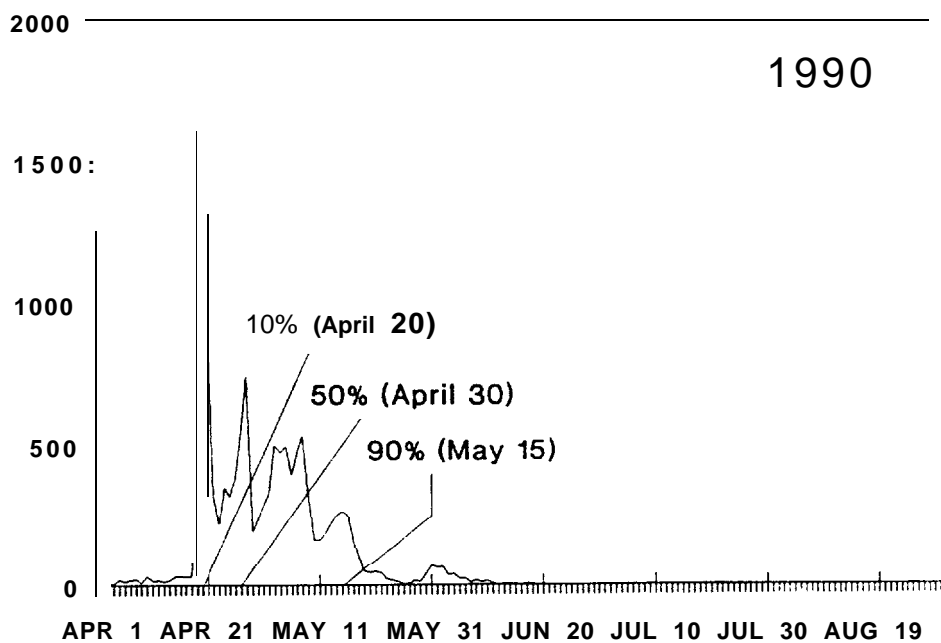
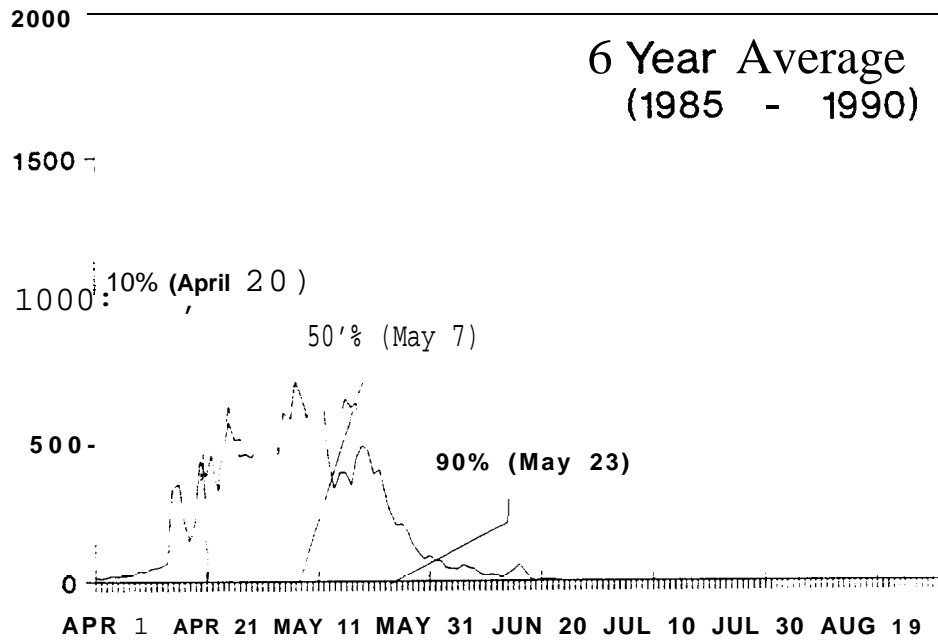
| MONTH   | CHINOOK  | CHINOOK | <u>STEELHEAD</u> |          | TOTAL  |        |         | TOTN     | TOTAL    |
|---------|----------|---------|------------------|----------|--------|--------|---------|----------|----------|
|         | YEARLING | SUBYEAS | WILD             | HATCHERY | STLHD. | COHO   | SOCKEYE | SALMONID | YEARLING |
| April   | 10,734   | 1,785   | 800              | 1,941    | 2,741  | 1      | 1,997   | 17,258   | 15,473   |
| May     | 9,557    | 2,488   | 2,127            | 10,936   | 13,063 | 14,722 | 1,751   | 41,581   | 39,093   |
| June    | 558      | 23,275  | 717              | 1,336    | 2,053  | 894    | 451     | 27,231   | 3,956    |
| July    | 2        | 21,697  | 63               | 116      | 179    | 0      | 47      | 21,925   | 228      |
| August  | 2        | 5,435   | 33               | 17       | 50     | 0      | 51      | 5,538    | 103      |
| TOTALS: | 20,853   | 54,680  | 3,740            | 14,346   | 18,086 | 15,617 | 4,297   | 113,533  | 58,853   |



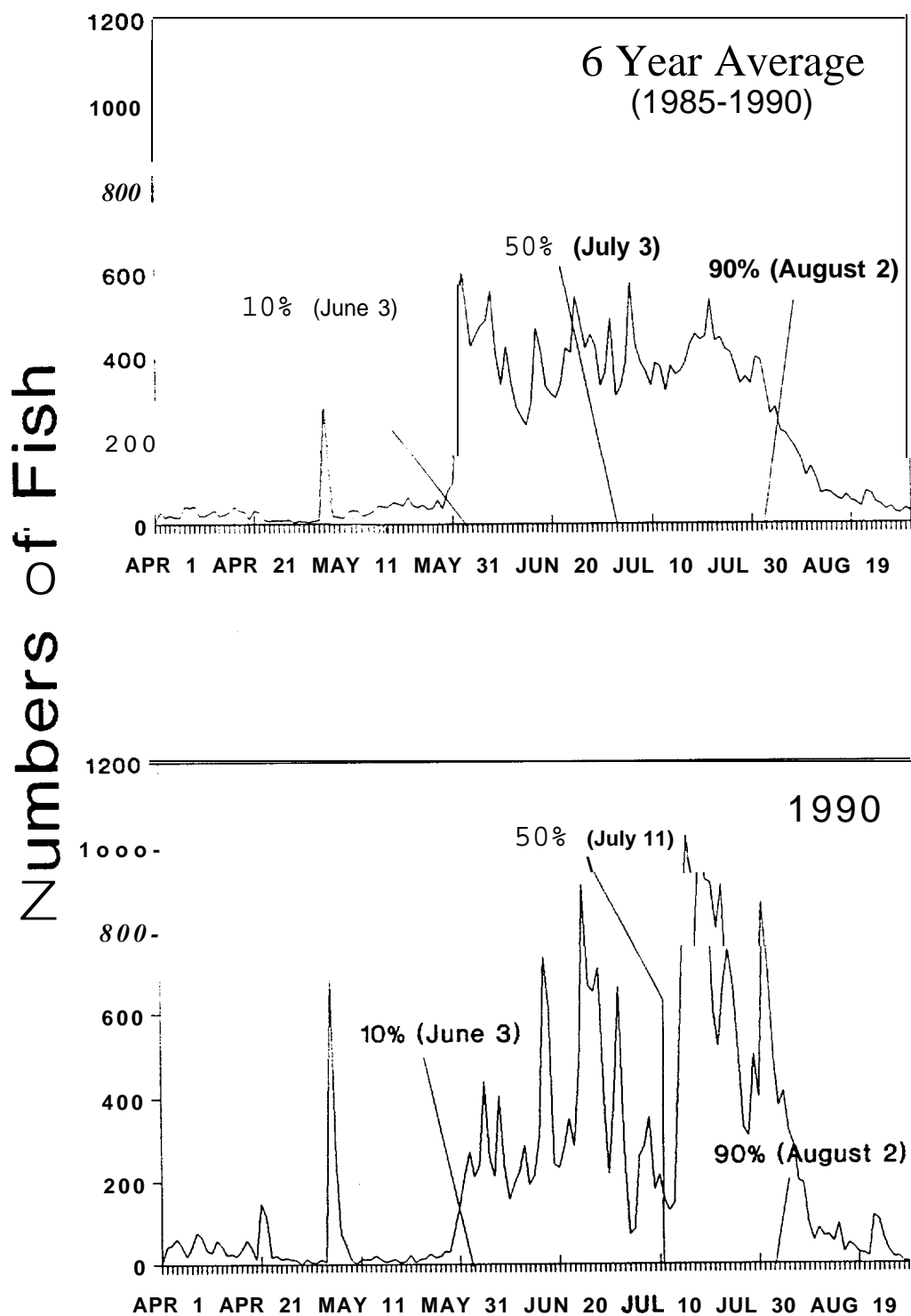
## **Appendix C**

**Daily juvenile salmonid run timing for 1990 and the 6 year average**

umbers of Fish

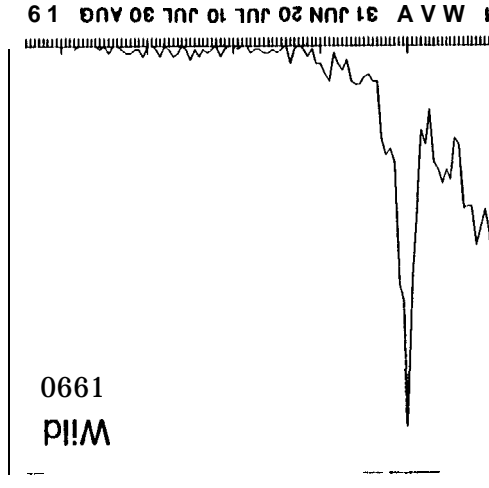
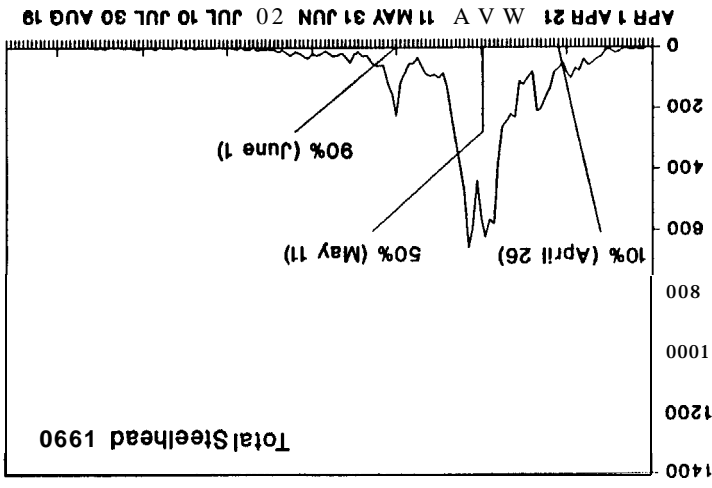
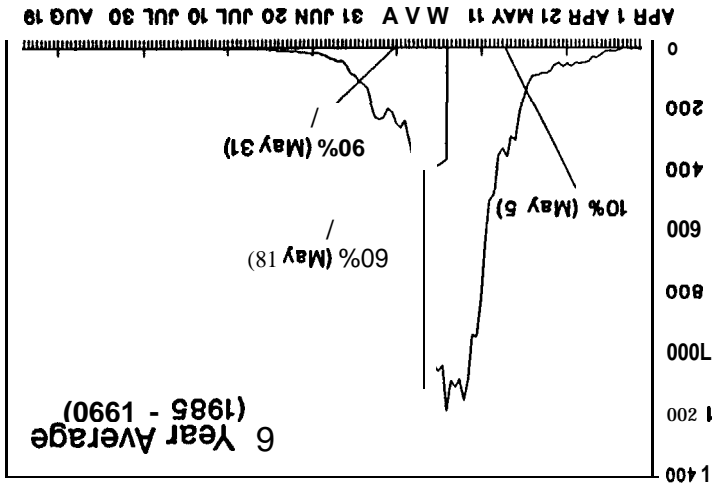


Appendix C-1. Chinook yearling juvenile run timing, Rock Island Dam, 1990 and the 6 year average.

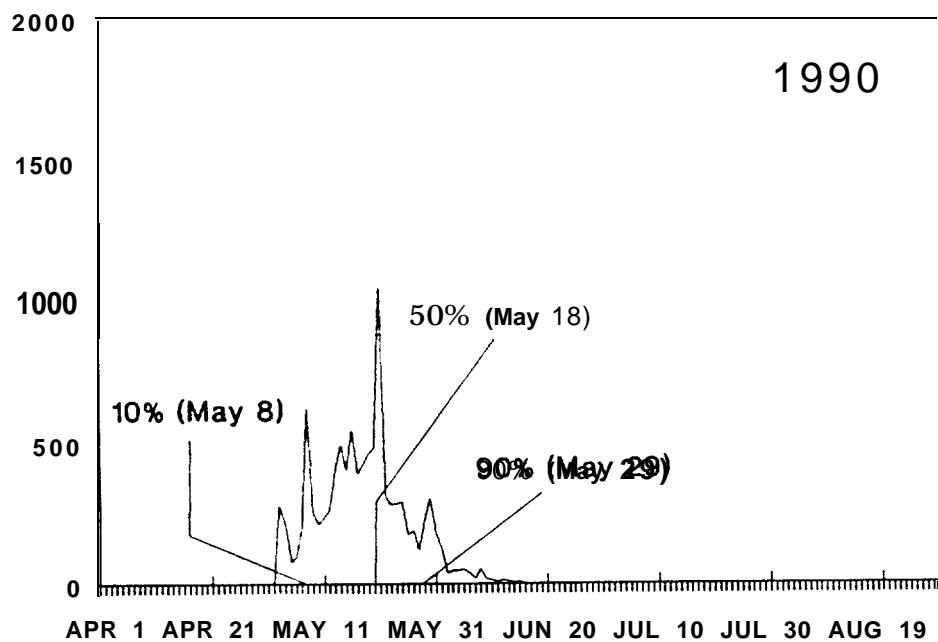
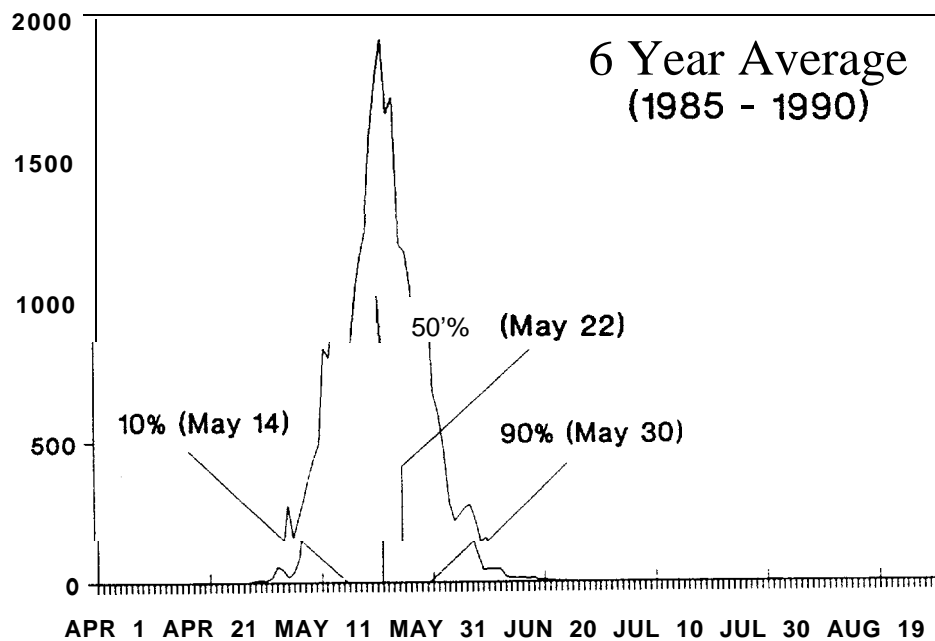


Appendix C-2. Chinook sub-yearling juvenile run **timing**, Rock Island Dam, 1990 and the 6 year average.

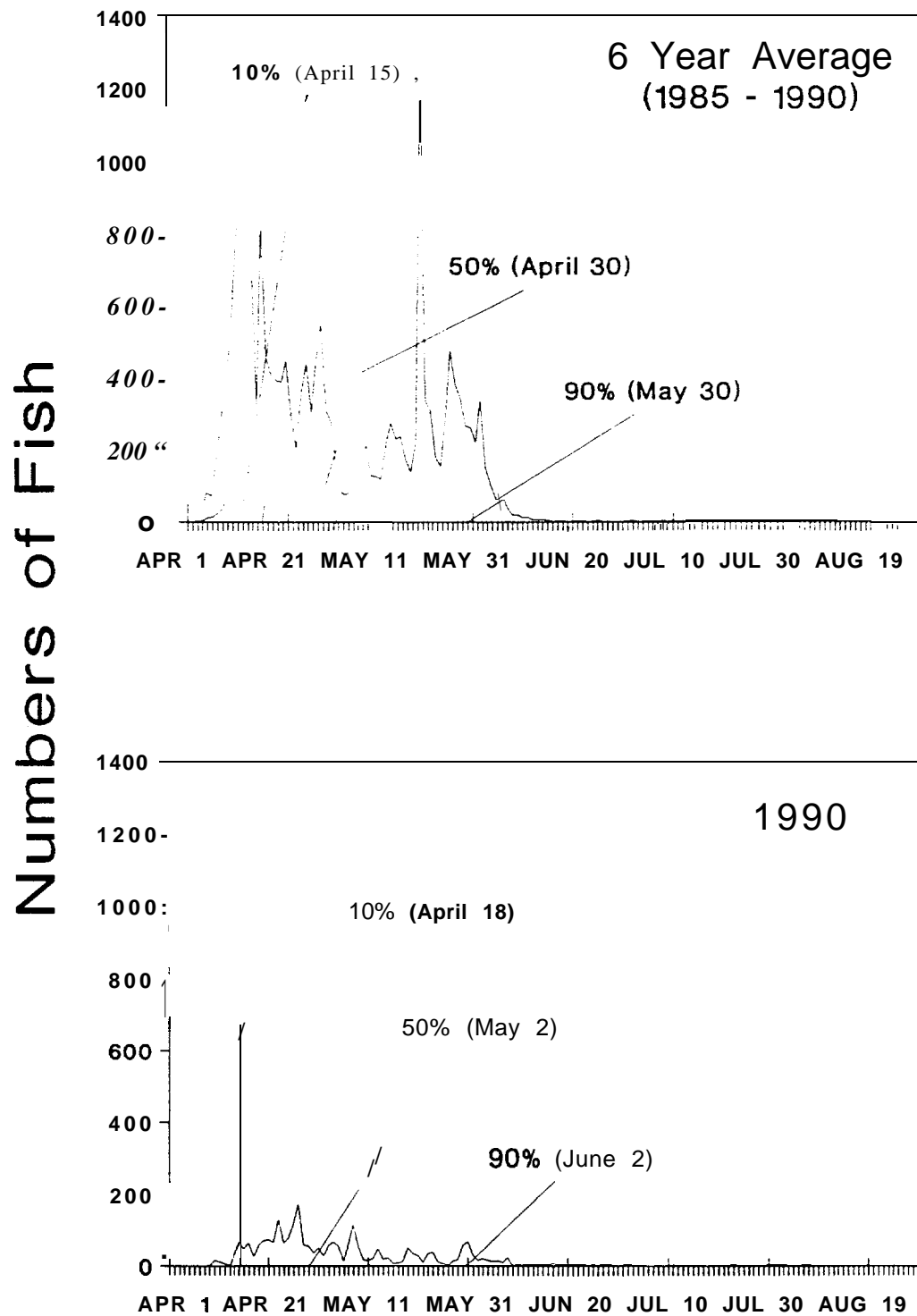
Appendix C-3. Steelhead juvenile run timing, Rock Island Dam, hatchery, naturally produced, total for 1990 and the 6 year average.



# Numbers of Fish

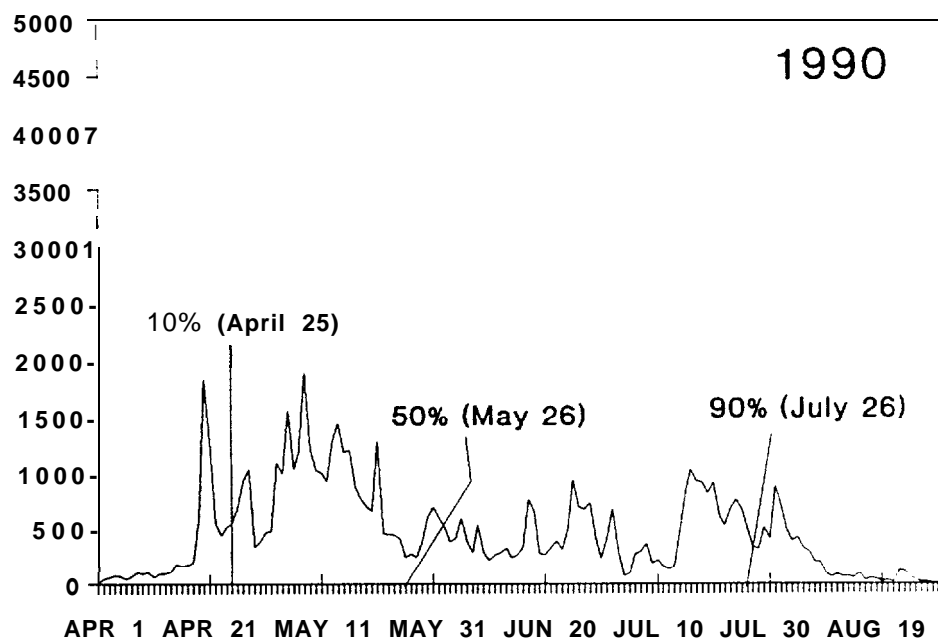
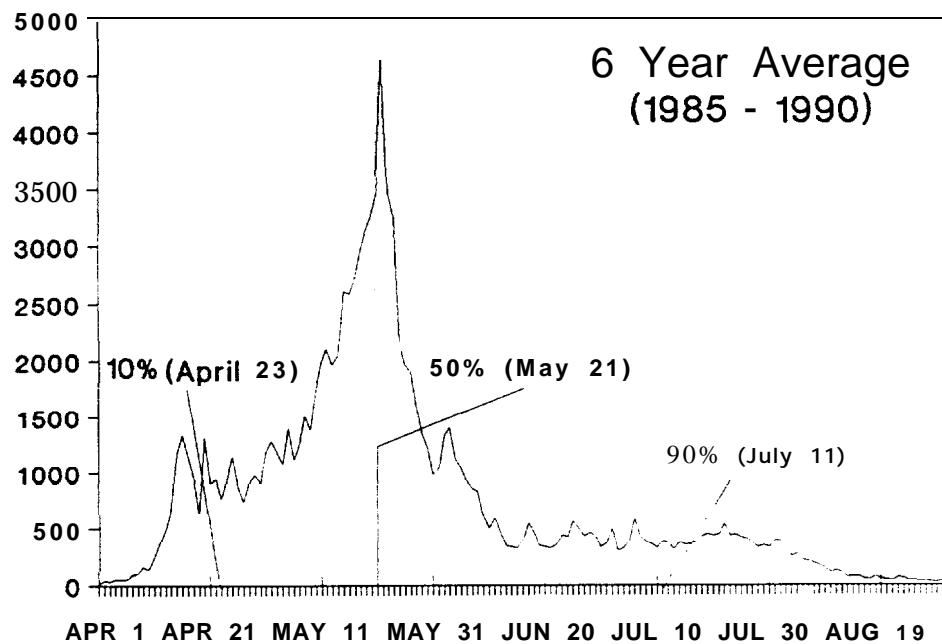


Appendix C-4. Coho juvenile run timing, Rock Island Dam, 1990 and the 6 year average.



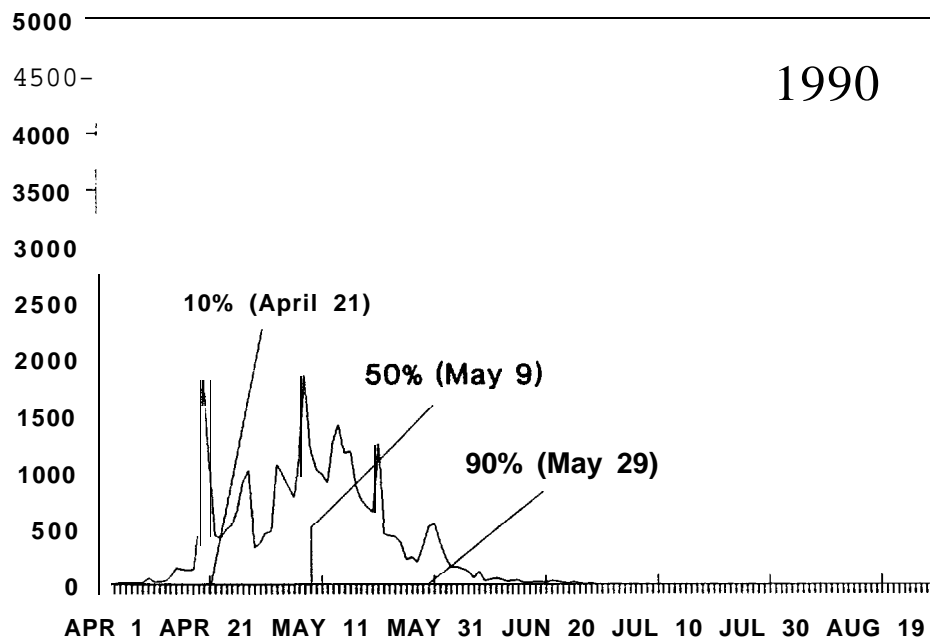
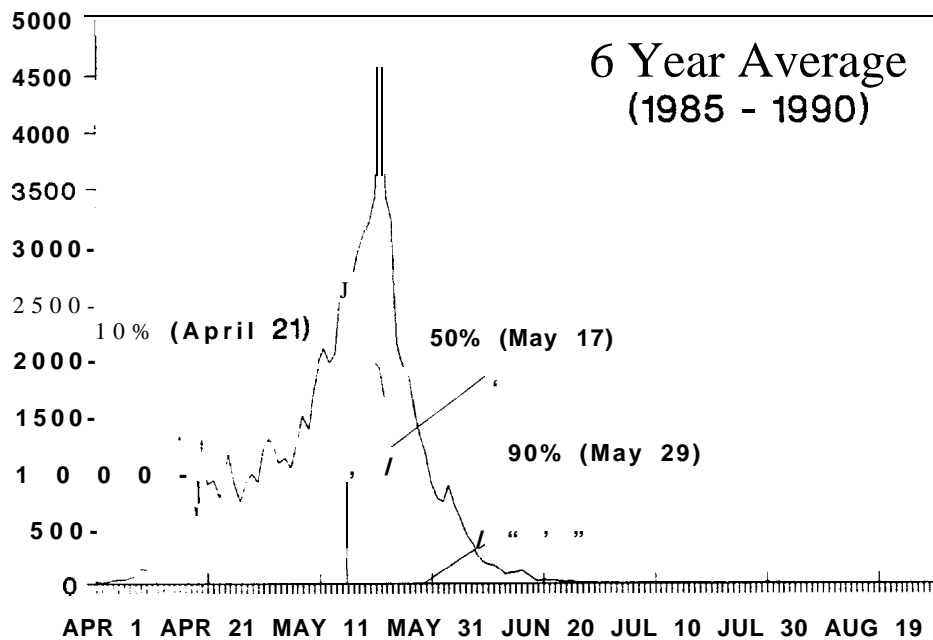
Appendix C-5. Sockeye juvenile run timing, Rock Island Dam, 1990 and the 6 year average.

Numbers of Fish



Appendix C-6. Total salmonid juvenile run timing, Rock Island Dam, 1990 and the 6 year average.

Numbers of Fish



Appendix C-7. Total yearling juvenile run timing, Rock Island Dam, 1990 and the 6 year average.



## **Appendix D**

**Daily summary of branded chinook and steelhead sampled from the  
Rock Island Dam bypass, 1 April -31 August**

Appendix D-1. Daily summary of branded chinook and steel head sampled from the Rock Island Dam bypass, April, 1990.

| DATE     | CHINOOK BRANDS |         |         |         |         |         |         |         |              |         | STEELHEAD BRANDS |       |         |         |         |         |
|----------|----------------|---------|---------|---------|---------|---------|---------|---------|--------------|---------|------------------|-------|---------|---------|---------|---------|
|          | Yearlings      |         |         |         |         |         |         |         | Subyearlings |         | Ad Clips         |       |         |         |         |         |
|          | RA/7C/1        | RA/7C/3 | LD/7C/1 | RA/7N/1 | RA/7N/3 | LA/7T/1 | LA/7T/3 | RD/7T/1 | LA/7H/1      | LA/7H/3 | Subyr            | Yrlng | LD/7H/1 | LD/7H/3 | RA/7H/1 | RA/7H/3 |
| 04/01/90 |                |         |         |         |         |         |         |         |              |         |                  |       |         |         |         | 0       |
| 04/02/90 |                |         |         |         |         |         |         |         |              |         |                  |       |         |         |         | 0       |
| 04/03/90 |                |         |         |         |         |         |         |         |              |         |                  |       |         |         |         | 0       |
| 04/04/90 |                |         |         |         |         |         |         |         |              |         |                  |       |         |         |         | 0       |
| 04/05/90 |                |         |         |         |         |         |         |         |              |         |                  |       |         |         |         | 0       |
| 04/06/90 |                |         |         |         |         |         |         |         |              |         |                  |       |         |         |         | 3       |
| 04/07/90 |                |         |         |         |         |         |         |         |              |         |                  |       |         |         |         | 0       |
| 04/08/90 |                |         |         |         |         |         |         |         |              |         |                  |       |         |         |         | 0       |
| 04/09/90 |                |         |         |         |         |         |         |         |              |         |                  |       |         |         |         | 1       |
| 04/10/90 |                |         |         |         |         |         |         |         |              |         |                  |       |         |         |         | 2       |
| 04/11/90 |                |         |         |         |         |         |         |         |              |         |                  |       |         |         |         | 0       |
| 04/12/90 |                |         |         |         |         |         |         |         |              |         |                  |       |         |         |         | 4       |
| 04/13/90 |                |         |         |         |         |         |         |         |              |         |                  |       |         |         |         | 24      |
| 04/14/90 |                |         |         |         |         |         |         |         |              |         |                  |       |         |         |         | 23      |
| 04/15/90 |                |         |         |         |         |         |         |         |              |         |                  |       |         |         |         | 30      |
| 04/16/90 |                |         |         |         |         |         |         |         |              |         |                  |       |         |         |         | 49      |
| 04/17/90 |                |         |         |         |         |         |         |         |              |         |                  |       |         |         |         | 24      |
| 04/18/90 |                |         |         |         |         |         |         |         |              |         |                  | 2     |         |         |         | 50      |
| 04/19/90 |                |         |         |         |         |         |         |         |              |         |                  | 6     |         |         |         | 57      |
| 04/20/90 |                |         |         |         |         |         |         |         |              |         |                  | 132   |         |         |         | 66      |
| 04/21/90 |                |         |         | 7       | 1       |         |         | 5       | 2            | 4       |                  | 102   |         |         |         | 52      |
| 04/22/90 |                |         |         | 2       | 1       |         |         | 2       | 2            |         |                  | 24    |         |         |         | 32      |
| 04/23/90 |                |         |         | 1       | 4       |         |         | 1       |              | 1       |                  | 13    |         |         |         | 37      |
| 04/24/90 |                |         |         | 7       | 6       |         |         | 3       | 1            | 3       |                  | 42    |         |         |         | 45      |
| 04/25/90 |                |         |         |         |         |         |         | 1       | 2            | 1       |                  | 22    |         |         |         | 104     |
| 04/26/90 |                |         |         |         |         |         |         | 3       |              | 4       |                  | 35    |         |         |         | 132     |
| 04/27/90 |                |         |         | 4       | 2       |         |         | 9       | 5            | 3       |                  | 68    |         |         |         | 157     |
| 04/28/90 |                |         |         | 1       |         |         |         | 5       | 4            | 3       |                  | 47    |         |         |         | 161     |
| 04/29/90 |                |         |         | 1       | 2       |         |         | 3       | 2            |         |                  | 25    |         |         | 1       | 67      |
| 04/30/90 |                |         |         | 1       |         |         |         | 1       | 2            |         |                  | 20    |         |         |         | 86      |
| TOTALS:  | 0              | 1       | 0       | 24      | 21      | 46      | 32      | 31      | 0            | 0       | 0                | 538   | 1       | 0       | 1       | 1209    |

Appendix D-2. Daily summary of branded chinook and steelhead sampled from the Rock Island Dam bypass, May, 1990.

| DATE     | CHINOOK BRANDS |         |         |         |         |              |         |          |        | STEELHEAD BRANDS |       |       |         | Ad Clips |        |         |         |      |
|----------|----------------|---------|---------|---------|---------|--------------|---------|----------|--------|------------------|-------|-------|---------|----------|--------|---------|---------|------|
|          | Yearlings      |         |         |         |         | Subyearlings |         | Ad Clips |        |                  |       |       |         |          |        |         |         |      |
|          | RA/7C/1        | RA/7C/3 | LD/7C/1 | RA/7N/1 | RA/7N/3 | LA/7T/1      | LA/7T/3 | RD/7T/1  | LA/H/1 | LA/H/3           | Subyr | Yrlng | LD/7H/1 |          | LD/7H3 | RA/7H/1 | RA/7H/3 |      |
| 05/01/90 |                |         |         |         |         | 2            | 3       | 2        |        |                  |       | 29    | 3       |          |        | 1       | 2       | 105  |
| 05/02/90 |                | 1       |         |         | 1       | 1            | 1       |          |        |                  |       | 21    | 2       |          |        | 2       |         | 85   |
| 05/03/90 | 1              |         |         |         | 1       | 1            | 5       | 3        |        |                  |       | 50    | 5       | 6        |        | 4       | 5       | 195  |
| 05/04/90 |                |         |         |         |         | 3            | 1       |          |        |                  |       | 28    | 3       | 5        |        | 5       | 2       | 187  |
| 03/05/90 |                |         |         |         |         | 10           | 4       |          |        |                  | 611   | 34    |         |          |        |         | 6       | 202  |
| 05/06/90 |                |         |         |         | 1       | 5            | 3       | 2        |        |                  | 240   | 47    | 6       | 11       |        | 3       | 3       | 223  |
| 05/07/90 |                |         |         |         | 2       | 6            | 2       | 2        |        |                  | 36    | 79    | 13      | 8        |        | 2       | 5       | 339  |
| 05/08/90 |                |         |         | 1       | 3       | 3            | 6       |          |        |                  | 19    | 40    | 9       | 16       | to     |         | 4       | 533  |
| 05/09/90 |                |         |         |         |         | 1            |         |          |        |                  | 3     | 10    | 23      | 19       |        | 4       | 7       | 513  |
| 05/10/90 | 1              |         |         |         |         | 2            |         | 1        |        |                  | 1     | 11    | 20      | 20       |        | 6       | 5       | 542  |
| 05/11/90 |                |         |         |         |         | 4            |         | 2        |        |                  | d     | 10    | 22      | 18       |        | 10      | 7       | 453  |
| 05/12/90 |                |         |         |         |         | 1            |         | 1        |        |                  | 2     | 6     | 23      | 15       |        | 5       | 6       | 354  |
| 05/13/90 |                |         |         |         |         |              |         | 1        |        |                  | 6     | 8     | 25      | 18       |        | 3       | 3       | 548  |
| 05/14/90 | 1              |         |         | 1       |         | 2            |         | 1        |        |                  | 13    | 10    | 15      | 13       |        | 1       | 2       | 608  |
| 05/15/90 |                |         |         | 1       |         | 1            | 1       | 1        |        |                  | 10    | 8     | 4       | 8        |        |         | 5       | 448  |
| 05/16/90 | 2              | 2       |         |         |         | 3            | 3       |          |        |                  | 5     | 15    | 3       | 3        |        | 5       | 3       | 341  |
| 05/17/90 |                |         |         |         |         |              | 2       |          |        |                  | 2     | 7     | 3       | 1        |        | 1       | 3       | 269  |
| 05/18/90 |                | 1       |         |         |         | 1            | 2       |          |        |                  | 2     | 5     | 3       | 1        |        |         | 1       | 176  |
| 05/19/90 |                | 1       |         |         |         |              |         |          |        |                  | 4     | 2     | 1       | 1        |        | 2       |         | 102  |
| 05/20/90 |                |         |         |         |         |              |         |          |        |                  | 5     | 1     |         | 1        |        | 1       | 1       | 57   |
| 03/21/90 |                | 1       |         |         |         |              |         |          |        |                  | 13    | 2     |         | 1        |        | 1       |         | 63   |
| 05/22/90 |                | 1       |         |         |         |              |         |          |        |                  | 3     | 1     |         |          |        |         | 2       | 52   |
| 05/23/90 |                |         |         |         |         |              |         |          |        |                  |       |       |         | 1        |        | 1       | 2       | 55   |
| 05/24/90 |                |         |         |         |         |              |         |          |        |                  | 3     |       | 1       | 1        |        |         | 2       | 53   |
| 03/25/90 |                |         |         |         |         |              |         |          |        |                  |       |       | 1       |          |        | 2       |         | 31   |
| 05/26/90 |                |         |         |         |         |              |         |          |        |                  | 6     |       |         |          |        |         |         | 16   |
| 05/27/90 |                |         |         |         |         |              |         |          |        |                  | 2     |       |         |          |        |         |         | 24   |
| 05/28/90 |                |         |         |         |         |              |         |          |        |                  | 7     |       |         | 1        |        |         |         | 30   |
| 05/29/90 |                |         |         |         |         |              |         |          |        |                  | 11    |       |         |          |        |         | 1       | 39   |
| 05/30/90 |                |         |         |         |         |              |         |          |        |                  | 37    | 1     |         |          |        |         |         | 48   |
| 05/31/90 | 1              |         |         |         |         |              |         |          |        |                  | 31    | 4     |         |          |        | 2       | 2       | 118  |
| TOTALS : | 6              | 8       | 0       | 3       | 8       | 49           | 33      | 16       | 0      | 0                | 1076  | 430   | 185     | 171      |        | 71      | 79      | 6871 |

Appendix D-3 Daily summary of branded chinook and steelhead sampled from the Rock Island Dam bypass, June, 1990

| CHINOOK BRANDS |         |         |         |         |         |         |         |              |        | STEELHEAD BRANDS |       |       |         | Ad Clips |         |          |     |
|----------------|---------|---------|---------|---------|---------|---------|---------|--------------|--------|------------------|-------|-------|---------|----------|---------|----------|-----|
| Yearlings      |         |         |         |         |         |         |         | Subyearlings |        | Ad Clips         |       |       |         |          |         | Ad Clips |     |
| DATE           | RA/7C/1 | RA/7C/3 | LD/7C/1 | RA/7N/1 | RA/7N/3 | LA/7T/1 | LA/7T/3 | RD/7T/1      | LA/H/1 | LA/H/3           | Subyr | Yrlng | LD/7H/1 | LD/7H/3  | RA/7H/1 | RA/7H/3  |     |
| 06/01/90       |         |         |         |         |         |         |         |              |        | 1                |       | 32    | 1       |          |         |          | 83  |
| 06/02/90       |         |         |         |         |         | 1       |         |              | 1      |                  |       | 32    | 3       | 2        |         |          | 53  |
| 06/03/90       |         |         |         |         |         |         | 1       |              |        | 1                |       | 14    | 2       |          |         |          | 26  |
| 06/04/90       |         |         |         |         |         |         | 1       |              |        | 4                |       | 43    | 2       |          |         |          | 31  |
| 06/05/90       |         |         |         |         |         |         |         |              | 1      | 1                |       | 44    | 0       |          |         |          | 31  |
| 06/06/90       |         |         |         |         |         | 1       |         |              | 2      | 2                |       | 56    | 1       |          |         |          | 21  |
| 06/07/90       |         |         |         |         |         |         |         |              | 2      |                  |       | 49    | 0       |          |         |          | 16  |
| 06/08/90       |         |         |         |         |         |         |         |              | 3      | 1                |       | 128   | 1       |          |         |          | 20  |
| 06/09/90       |         |         |         |         |         |         |         |              | 2      | 2                |       | 50    | 1       |          |         |          | 8   |
| 06/10/90       |         |         |         |         |         |         |         |              |        | 4                |       | 27    | 1       |          |         |          | 13  |
| 06/11/90       |         |         |         |         |         |         |         |              |        |                  |       | 18    |         |          |         |          | 39  |
| 06/12/90       |         |         |         |         |         |         |         |              |        |                  |       | 19    | 0       |          |         |          | 20  |
| 06/13/90       |         |         |         |         |         |         |         |              | 1      | 1                |       | 22    | 1       |          |         |          | 10  |
| 06/14/90       |         |         |         |         |         |         |         |              | 1      |                  |       | 17    |         |          |         |          | 21  |
| 06/15/90       |         |         |         |         |         |         |         |              |        | 2                |       | 40    | 0       |          |         |          | 23  |
| 06/16/90       |         |         |         |         |         |         |         |              | 4      |                  |       | 31    | 0       |          |         |          | 14  |
| 06/17/90       |         |         |         |         |         |         |         |              | 2      | 5                |       | 59    | 0       |          |         |          | 9   |
| 06/18/90       |         |         |         |         |         |         |         |              | 3      | 4                |       | 30    |         |          |         |          | 13  |
| 06/19/90       |         |         |         |         |         |         |         |              | 2      | 3                |       | 16    |         |          |         |          | 17  |
| 06/20/90       |         |         |         |         |         |         |         |              |        | 1                |       | 17    |         |          |         |          | 17  |
| 06/21/90       |         |         |         |         |         |         |         |              |        |                  |       | 20    |         |          |         |          | 32  |
| 06/22/90       |         |         |         |         |         |         |         |              | 2      | 1                |       | 27    |         |          |         |          | 28  |
| 06/23/90       |         |         |         |         |         |         |         |              | 1      | 5                |       | 18    |         |          |         |          | 16  |
| 06/24/90       |         |         |         |         |         |         |         |              | 9      | 2                |       | 40    |         |          |         |          | 14  |
| 06/25/90       |         |         |         |         |         |         |         |              | 6      | 3                |       | 39    |         |          |         |          | 27  |
| 06/26/90       |         |         |         |         |         |         |         |              | 8      | 1                |       | 37    |         |          |         |          | 19  |
| 06/27/90       |         |         |         |         |         |         |         |              | 6      | 10               |       | 21    |         |          |         |          | s   |
| 06/28/90       |         |         |         |         |         |         |         |              | 11     | 4                |       | 27    |         |          |         |          | 16  |
| 06/29/90       |         |         |         |         |         |         |         |              | 9      | 6                |       | 24    |         |          |         |          | 7   |
| 06/30/90       |         |         |         |         |         |         |         |              | 1      | 3                |       | 11    |         |          |         |          | 5   |
| TOTALS:        | 0       | 0       | 1       | 0       | 0       | 1       | 2       | n            | 82     | 61               | 1014  | 13    | 2       | 0        | 0       | 0        | 654 |

Appendix D-4. Daily summary of branded chinook and steelhead sampled from the Rock Island Dam bypass, July, 1990.

| DATE     | CHINOOK BRANDS |         |         |         |         |          |         |         | STEELHEAD BRANDS |        |          |       | Ad Clips |         |        |         |         |
|----------|----------------|---------|---------|---------|---------|----------|---------|---------|------------------|--------|----------|-------|----------|---------|--------|---------|---------|
|          | Yearlings      |         |         |         |         |          |         |         | Subyearlings     |        | Ad Clips |       |          |         |        |         |         |
|          | RA/7C/1        | RA/7C/3 | LD/7C/1 | RA/7N/1 | RA/7N/3 | LA 17111 | LA/71/3 | RD/71/1 | LA/n/1           | LA/H/3 | Subyr    | Yrlng |          | LD/7H/1 | LD/7H3 | RA/7H/1 | RA/7H/3 |
| 07/01/90 |                |         |         |         |         |          |         |         | 2                | 2      |          | 6     |          |         |        |         | 5       |
| 07/02/90 |                |         |         |         |         |          |         |         | 3                | 3      |          | 20    |          |         |        |         | 4       |
| 07/03/90 |                |         |         |         |         |          |         |         | 2                |        |          | 11    |          |         |        |         | 10      |
| 07/04/90 |                |         |         |         |         |          |         |         | 1                |        |          | 4     |          |         |        |         | 0       |
| 07/05/90 |                |         |         |         |         |          |         |         | 1                |        |          |       |          |         |        |         | 7       |
| 07/06/90 |                |         |         |         |         |          |         |         |                  | 1      |          |       |          |         |        |         | 4       |
| 07/07/90 |                |         |         |         |         |          |         |         | 5                |        |          | 3     |          |         |        |         | 1       |
| 07/08/90 |                |         |         |         |         |          |         |         | 1                | 2      |          |       |          |         |        |         | 6       |
| 07/09/90 |                |         |         |         |         |          |         |         |                  |        |          |       |          |         |        |         | 2       |
| 07/10/90 |                |         |         |         |         |          |         |         |                  |        |          |       |          |         |        |         | 1       |
| 07/11/90 |                |         |         |         |         |          |         |         |                  |        |          |       |          |         |        |         | 2       |
| 07/12/90 |                |         |         |         |         |          |         |         |                  |        |          |       |          |         |        |         | 0       |
| 07/13/90 |                |         |         |         |         |          |         |         |                  |        |          | 3     |          |         |        |         | 0       |
| 07/14/90 |                |         |         |         |         |          |         |         |                  |        |          |       |          |         |        |         | 2       |
| 07/15/90 |                |         |         |         |         |          |         |         | 1                |        |          | 1     |          |         |        |         | 2       |
| 07/16/90 |                |         |         |         |         |          |         |         |                  |        |          | 1     |          |         |        |         | 0       |
| 07/17/90 |                |         |         |         |         |          |         |         |                  |        |          | 1     |          |         |        |         | 1       |
| 07/18/90 |                |         |         |         |         |          |         |         |                  |        |          | 0     |          |         |        |         | 1       |
| 07/19/90 |                |         |         |         |         |          |         |         |                  |        |          | 2     |          |         |        |         | 0       |
| 07/20/90 |                |         |         |         |         |          |         |         |                  |        |          |       |          |         |        |         | 1       |
| 07/21/90 |                |         |         |         |         |          |         |         |                  |        |          |       |          |         |        |         | 0       |
| 07/22/90 |                |         |         |         |         |          |         |         |                  |        |          | 1     |          |         |        |         | 0       |
| 07/23/90 |                |         |         |         |         |          |         |         | 1                |        |          | 25    |          |         |        |         | 2       |
| 07/24/90 |                |         |         |         |         |          |         |         |                  |        |          | 41    |          |         |        |         | 0       |
| 07/25/90 |                |         |         |         |         |          |         |         |                  |        |          | 15    |          |         |        |         | 1       |
| 07/26/90 |                |         |         |         |         |          |         |         | 1                |        |          | 5     |          |         |        |         | 0       |
| 07/27/90 |                |         |         |         |         |          |         |         |                  |        |          | 1     |          |         |        |         | 3       |
| 07/28/90 |                |         |         |         |         |          |         |         |                  |        |          | 0     |          |         |        |         | 2       |
| 07/29/90 |                |         |         |         |         |          |         |         |                  |        |          | 3     |          |         |        |         | 3       |
| 07/30/90 |                |         |         |         |         |          |         |         |                  |        |          | 8     |          |         |        |         | 1       |
| 07/31/90 |                |         |         |         |         |          |         |         |                  |        |          | 8     |          |         |        |         | 4       |
| TOTALS:  | 0              | 0       | 0       | 0       | 0       | 0        | 0       | 0       | 18               | 8      | 157      | 0     | 0        | 0       | 0      | 0       | 61      |

Appendix D-5. Daily summary of branded chinook and steel head sampled from the Rock Island Dam bypass, August, 1990.

| DATE     | CHINOOK BRANDS |         |         |         |         |         |         |         |              | STEELHEAD BRANDS |          |       |          |         |         |         |   |  |
|----------|----------------|---------|---------|---------|---------|---------|---------|---------|--------------|------------------|----------|-------|----------|---------|---------|---------|---|--|
|          | Yearlings      |         |         |         |         |         |         |         | Subyearlings |                  | Ad Clips |       | Ad Clips |         |         |         |   |  |
|          | RA/7C/1        | RA/7C/3 | LD/7C/1 | RA/7N/1 | RA/7N/3 | LA/7T/1 | LA/7T/3 | RD/7T/1 | LA/7H/1      | LA/7H/3          | Subyr    | Yrlng | LD/7H/1  | LD/7H/3 | RA/7H/1 | RA/7H/3 |   |  |
| 08/01/90 |                |         |         |         |         |         |         |         |              |                  |          | 3     |          |         |         |         | 3 |  |
| 08/02/90 |                |         |         |         |         |         |         |         |              |                  |          | 5     |          |         |         |         | 2 |  |
| 08/03/90 |                |         |         |         |         |         |         |         |              |                  |          | 3     |          |         |         |         | 1 |  |
| 08/04/90 |                |         |         |         |         |         |         |         |              |                  |          | 3     |          |         |         |         | 1 |  |
| 08/05/90 |                |         |         |         |         |         |         |         |              |                  |          | 0     |          |         |         |         | 0 |  |
| 08/06/90 |                |         |         |         |         |         |         |         |              |                  |          | 1     |          |         |         |         | 0 |  |
| 08/07/90 |                |         |         |         |         |         |         |         |              |                  |          | 1     |          |         |         |         | 0 |  |
| 08/08/90 |                |         |         |         |         |         |         |         |              |                  |          | 0     |          |         |         |         | 0 |  |
| 08/09/90 |                |         |         |         |         |         |         |         |              |                  |          | 0     |          |         |         |         | 0 |  |
| 08/10/90 |                |         |         |         |         |         |         |         |              |                  |          | 0     |          |         |         |         | 1 |  |
| 08/11/90 |                |         |         |         |         |         |         |         |              |                  |          | 2     |          |         |         |         | 1 |  |
| 08/12/90 |                |         |         |         |         |         |         |         |              |                  |          |       |          |         |         |         |   |  |
| 08/13/90 |                |         |         |         |         |         |         |         |              |                  |          |       |          |         |         |         |   |  |
| 08/14/90 |                |         |         |         |         |         |         |         |              |                  |          | 0     |          |         |         |         |   |  |
| 08/15/90 |                |         |         |         |         |         |         |         |              |                  |          | 1     | 1        |         |         |         |   |  |
| 08/16/90 |                |         |         |         |         |         |         |         |              |                  |          |       |          |         |         |         |   |  |
| 08/17/90 |                |         |         |         |         |         |         |         |              |                  |          |       |          |         |         |         |   |  |
| 08/18/90 |                |         |         |         |         |         |         |         |              |                  |          |       |          |         |         |         |   |  |
| 08/19/90 |                |         |         |         |         |         |         |         |              |                  |          |       |          |         |         |         |   |  |
| 08/20/90 |                |         |         |         |         |         |         |         |              |                  |          |       |          |         |         |         |   |  |
| 08/21/90 |                |         |         |         |         |         |         |         |              |                  |          |       |          |         |         |         |   |  |
| 08/22/90 |                |         |         |         |         |         |         |         |              |                  |          |       |          |         |         |         |   |  |
| 08/23/90 |                |         |         |         |         |         |         |         |              |                  |          |       |          |         |         |         |   |  |
| 08/24/90 |                |         |         |         |         |         |         |         |              |                  |          |       |          |         |         |         |   |  |
| 08/25/90 |                |         |         |         |         |         |         |         |              |                  |          |       |          |         |         |         |   |  |
| 08/26/90 |                |         |         |         |         |         |         |         |              |                  |          |       |          |         |         |         |   |  |
| 08/27/90 |                |         |         |         |         |         |         |         |              |                  |          |       |          |         |         |         |   |  |
| 08/28/90 |                |         |         |         |         |         |         |         |              |                  |          |       |          |         |         |         |   |  |
| 08/29/90 |                |         |         |         |         |         |         |         |              |                  |          |       |          |         |         |         |   |  |
| 08/30/90 |                |         |         |         |         |         |         |         |              |                  |          |       |          |         |         |         |   |  |
| 08/31/90 |                |         |         |         |         |         |         |         |              |                  |          |       |          |         |         |         |   |  |
| TOTALS:  | 0              | 0       | 0       | 0       | 0       | 0       | 0       | 0       | 0            | 0                | 21       | 1     | 0        | 0       | 0       | 0       | 9 |  |

Appendix D-6. Monthly summary of branded chinook and steelhead sampled from the Rock Island Dam bypass, 1 April -31 August, 1990.

| MONTH   | CHINOOK BRANDS |         |         |         |         |         |         |         |              |         | STEELHEAD BRANDS |       |         |         |         |         |          |
|---------|----------------|---------|---------|---------|---------|---------|---------|---------|--------------|---------|------------------|-------|---------|---------|---------|---------|----------|
|         | Yearlings      |         |         |         |         |         |         |         | Subyearlings |         | Ad Clips         |       |         |         |         |         | Ad Clips |
|         | RA/7C/1        | RA/7C/3 | LD/7C/1 | RA/7N/1 | RA/7N/3 | LA/7T/1 | LA/7T/3 | RD/7T/1 | LA/7H/1      | LA/7H/3 | Subyr            | YrIng | LD/7H/1 | LD/7H/3 | RA/7H/1 | RA/7H/3 |          |
| April   | 0              | 1       | 0       | 24      | 27      | 46      | 32      | 31      | 0            | 0       | 0                | 538   | 1       | 0       | 1       | 4       | 1209     |
| May     | 6              | 8       | 0       | 3       | 8       | 44      | 33      | 16      | 0            | 0       | 1076             | 430   | 185     | 171     | 71      | 79      | 6871     |
| June    | 0              | 0       | 1       | 0       |         |         |         | 0       | 82           | 62      | 1014             | 13    | 2       | 0       | 0       | 0       | 654      |
| July    | 0              | 0       | 0       |         |         |         |         |         | 18           | 8       | 157              | 0     | 0       | 0       | 0       | 0       | 61       |
| August  | 0              | 0       | 0       | 0       | 0       | 0       |         | 0       | 0            | 0       | 21               | 1     | 0       | 0       | 0       | 0       | 9        |
| TOTALS: | 6              | 9       | 1       | 27      | 35      | 97      | 67      | 41      | 100          | 70      | 2268             | 982   | 188     | 171     | 72      | 83      | 8804     |

## **Appendix E**

**Daily summary of branded accelerated growth chinook sub-yearlings  
captured at the Rock Island Dam bypass trap, 1 April -31 August**



Appendix E-1. Daily summary of branded accelerated growth chinook sub-yearlings  
captured at the Rock **Island** bypass trap, April , 1990.

| DATE       | LA/Y/1 | LA/Y/2 | LA/Y/3 | LA/Y/4 | RA/Y/1 | RA/Y/2 | RA/Y/3 | RA/Y/4 |
|------------|--------|--------|--------|--------|--------|--------|--------|--------|
| 04/01/90   |        |        |        |        |        |        |        |        |
| 04102190   |        |        |        |        |        |        |        |        |
| 04/03190   |        |        |        |        |        |        |        |        |
| 04/04/90   |        |        |        |        |        |        |        |        |
| 04/05/90   |        |        |        |        |        |        |        |        |
| 04/06/90   |        |        |        |        |        |        |        |        |
| 04/07/90   |        |        |        |        |        |        |        |        |
| 04/08/90   |        |        |        |        |        |        |        |        |
| 04/09/90   |        |        |        |        |        |        |        |        |
| 04/10/90   |        |        |        |        |        |        |        |        |
| 04/ 11 /90 |        |        |        |        |        |        |        |        |
| 04/12/90   |        |        |        |        |        |        |        |        |
| 04/ 13J90  |        |        |        |        |        |        |        |        |
| 04/14/90   |        |        |        |        |        |        |        |        |
| 04/15/90   |        |        |        |        |        |        |        |        |
| 04/ 16/90  |        |        |        |        |        |        |        |        |
| 04/ 17t90  |        |        |        |        |        |        |        |        |
| 04/18/90   |        |        |        |        |        |        |        |        |
| 04/19/90   |        |        |        |        |        |        |        |        |
| 04/20/90   |        |        |        |        |        |        |        |        |
| 04/21/90   |        |        |        |        |        |        |        |        |
| 04122190   |        |        |        |        |        |        |        |        |
| 04/23190   |        |        |        |        |        |        |        |        |
| 04124190   |        |        |        |        |        |        |        |        |
| 04/2s190   |        |        |        |        |        |        |        |        |
| 04126190   |        |        |        |        |        |        |        |        |
| 04/27/90   |        |        |        |        |        |        |        |        |
| 04/28/90   |        |        |        |        |        |        |        |        |
| 04/29190   |        |        |        |        |        |        |        |        |
| 04130190   |        |        |        |        |        |        |        |        |
| TOTALS:    | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |

Appendix E-2. Daily summary of branded accelerated growth chinook sub-yearlings captured at the Rock Island bypass trap, May, 1990.

| DATE     | LA/Y/1 | LA/Y/2 | LA/Y/3 | LA/Y/4 | RA/Y/1 | RA/Y/2 | RA/Y/3 | RA/Y/4 |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|
| 05/01/90 |        |        |        |        |        |        |        |        |
| 05102190 |        |        |        |        |        |        |        |        |
| 05/03/90 |        |        |        |        |        |        |        |        |
| 05104190 |        |        |        |        |        |        |        |        |
| 05/05/90 | 149    | 147    | 163    | 152    | 5      | 1      | 9      |        |
| 05106190 | 50     | 55     | 68     | 67     | 1      | 2      | 4      |        |
| 05/07190 | 10     | 11     | 11     | 4      | 1      |        | 3      |        |
| 05108190 | 6      | 2      | 1      | 4      | 4      | 1      |        |        |
| 05/09/90 | 2      |        | 1      |        | 1      | 2      |        |        |
| 05/10190 |        |        |        | 1      |        | 1      |        |        |
| 05/11/90 |        | 3      |        | 1      |        | 2      |        | 1      |
| 05/12/90 | 1      |        |        | 1      | 2      | 2      |        |        |
| 05/13/90 |        |        |        |        |        |        |        |        |
| 05/14/90 | 6      | 3      | 2      | 2      | 2      | 1      | 2      |        |
| 05/15/90 | 2      | 5      | 2      | 1      | 3      | 3      | 1      | 1      |
| 05/16/90 | 1      | 1      | 3      |        | 1      | 3      | 2      | 2      |
| 05/17/90 |        |        | 1      | 1      | 1      | 1      | 2      | 1      |
| 05/18/90 | 1      |        |        | 1      | 1      | 4      |        | 1      |
| 05/19/90 | 2      | 1      | 1      |        |        | 1      | 2      |        |
| 05/20/90 |        | 2      | 2      | 1      | 2      |        | 1      |        |
| 05/21/90 | 2      | 1      | 3      | 7      |        |        | 1      |        |
| 05/22/90 | 2      | 1      |        |        | 1      |        |        | 1      |
| 05123190 |        |        |        |        |        |        |        |        |
| 05/24/90 |        |        |        | 3      |        |        | 1      | 1      |
| 05125190 |        |        |        |        |        |        |        |        |
| 05/26/90 | 1      | 1      | 4      |        |        |        |        |        |
| 05127190 |        | 1      |        | 1      |        |        |        |        |
| 05/28/90 |        | 3      | 2      |        |        |        | 1      | 1      |
| 05129190 | 4      | 3      | 2      | 2      |        |        |        | 1      |
| 05130190 | 7      | 10     | 10     | 6      | 2      |        | 1      | 1      |
| 05131190 | 8      | 2      | 11     | 4      | 3      |        |        | 1      |
| TOTALS;  | 254    | 252    | 293    | 259    | 30     | 24     | 30     | 27     |

Appendix E-3. Daily summary of branded accelerated growth chinook sub-yearlings captured at the Rock Island bypass trap, June, 1990.

| DATE     | LA/Y/1 | LA/Y/2 | LA/Y/3 | LA/Y/4 | RA/Y/1 | RA/Y/2 | RA/Y/3 | RA/Y/4 |
|----------|--------|--------|--------|--------|--------|--------|--------|--------|
| 06/01/90 | 6      | 5      | 9      | 3      |        |        | 1      |        |
| 06/02/90 | 5      | 1      | 3      | 5      |        | 1      |        |        |
| 06/03/90 | 3      | 1      | 3      | 1      |        | 2      | 1      |        |
| 06/04/90 | 11     |        | 6      | 5      | 2      | 1      | 1      |        |
| 06/05/90 | 6      | 4      | 5      | 4      |        |        |        |        |
| 06/06/90 | 7      | 9      | 4      | 9      |        |        |        |        |
| 06/07/90 | 9      | 6      | 7      | 7      |        |        |        |        |
| 06/08/90 | 29     | 17     | 20     | 22     |        |        |        |        |
| 06/09/90 | 7      | 2      | 6      | 5      |        |        |        |        |
| 06/10/90 |        | 3      | 5      | 3      |        |        |        |        |
| 06/11/90 | 2      | 5      | 1      | 2      |        |        |        |        |
| 06/12/90 | 1      | 2      | 3      | 5      |        |        |        |        |
| 06/13/90 | 6      | 5      | 4      | 1      |        |        |        |        |
| 06/14/90 | 4      | 6      |        | 2      |        |        |        |        |
| 06/15/90 | 12     | 4      | 8      | 4      |        |        |        |        |
| 06/16/90 | 7      | 4      | 2      | 4      |        |        |        |        |
| 06/17/90 | 11     | 8      | 11     | 4      |        |        |        |        |
| 06/18/90 | 3      | 3      |        |        |        |        |        |        |
| 06/19/90 | 2      |        | 1      | 1      |        |        |        |        |
| 06/20/90 |        | 2      | 1      |        |        |        |        |        |
| 06/21/90 |        |        | 1      |        |        |        |        |        |
| 06/22/90 |        |        | 2      |        |        |        |        |        |
| 06/23/90 |        |        |        |        |        |        |        |        |
| 06/24/90 |        |        |        |        |        |        |        |        |
| 06/25/90 |        |        |        |        |        |        |        |        |
| 06/26/90 | 1      |        |        |        |        |        |        |        |
| 06/27/90 |        |        | 1      |        |        |        |        |        |
| 06/28/90 |        |        | 1      |        |        |        |        |        |
| 06/29/90 |        |        |        |        |        |        |        |        |
| 06/30/90 |        |        |        |        |        |        |        |        |
| TOTALS:  | 132    | 87     | 106    | 87     | 2      | 5      | 3      | 2      |

Appendix E-4. Daily summary of branded accelerated growth chinook sub-yearlings  
captured at the Rock Island bypass trap, July, 1990.

| DATE:            | LA/Y/1 | LA/Y/2 | LA/Y/3 | LA/Y/4 | RA/Y/1 | RA/Y/2 | RA/Y/3 | RA/Y/4 |
|------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| 07/01/90         |        |        |        |        |        |        |        |        |
| 07102190         |        |        |        |        |        |        |        |        |
| 07/03/90         |        |        |        |        |        |        |        |        |
| 07/04/90         |        |        |        |        |        |        |        |        |
| 07/05/90         |        |        |        |        |        |        |        |        |
| <b>07/06/90</b>  |        |        |        |        |        |        |        |        |
| 07/07/90         |        |        |        |        |        |        |        |        |
| 07108190         |        |        |        |        |        |        |        |        |
| 07/09/90         |        |        |        |        |        |        |        |        |
| 07/ 10/90        |        |        |        |        |        |        |        |        |
| 07/11/90         |        |        |        |        |        |        |        |        |
| 07/12/90         |        |        |        |        |        |        |        |        |
| 07/13/90         |        |        |        |        |        |        |        |        |
| 07/14/90         |        |        |        |        |        |        |        |        |
| 07/ 15/90        | 1      |        |        |        |        |        |        |        |
| <b>07/ 16/90</b> |        |        |        |        |        |        |        |        |
| 07/ 17/90        |        |        |        |        |        |        |        |        |
| <b>07/18/90</b>  |        |        |        |        |        |        |        |        |
| <b>07/19/90</b>  |        |        |        |        |        |        |        |        |
| <b>07/20/90</b>  |        |        |        |        |        |        |        |        |
| <b>0712 1/90</b> |        |        |        |        |        |        |        |        |
| <b>07122190</b>  |        |        |        |        |        |        |        |        |
| <b>07123190</b>  |        |        |        |        |        |        |        |        |
| <b>07/24190</b>  |        |        |        |        |        |        |        |        |
| <b>07/2s/90</b>  |        |        |        |        |        |        |        |        |
| <b>07/26/90</b>  |        |        |        |        |        |        |        |        |
| <b>07/27190</b>  |        |        |        |        |        |        |        |        |
| <b>07128190</b>  |        |        |        |        |        |        |        |        |
| <b>07/29/90</b>  |        |        |        |        |        |        |        |        |
| <b>07/30/90</b>  |        |        |        |        |        |        |        |        |
| <b>07/31/90</b>  |        |        |        |        |        |        |        |        |
| TOTALS:          | 1      | 0      | 0      | 0      | 0      | 0      | 0      | 0      |

Appendix E-5. Daily summary of branded accelerated growth chinook sub-yearlings  
captured at the Rock Island bypass trap, August, 1990.

| DATE     | LA/Y/1 | LA/Y/2 | LA/Y/3 | LA/Y/4 | RA/Y/ 1 | RA/Y/2 | RA/Y/3 | RA/Y/4 |
|----------|--------|--------|--------|--------|---------|--------|--------|--------|
| 08101/90 |        |        |        |        |         |        |        |        |
| 08102/90 |        |        |        |        |         |        |        |        |
| 08103/90 |        |        |        |        |         |        |        |        |
| 08/04/90 |        |        |        |        |         |        |        |        |
| 08105/90 |        |        |        |        |         |        |        |        |
| 08/06/90 |        |        |        |        |         |        |        |        |
| 08/07/90 |        |        |        |        |         |        |        |        |
| 08108/90 |        |        |        |        |         |        |        |        |
| 08109/90 |        |        |        |        |         |        |        |        |
| 08110/90 |        |        |        |        |         |        |        |        |
| 08/11/90 |        |        |        |        |         |        |        |        |
| 08/12/90 |        |        |        |        |         |        |        |        |
| 08/13/90 |        |        |        |        |         |        |        |        |
| 08114/90 |        |        |        |        |         |        |        |        |
| 08/15/90 |        |        |        |        |         |        |        |        |
| 08116/90 |        |        |        |        |         |        |        |        |
| 08/17/90 |        |        |        |        |         |        |        |        |
| 08/18/90 |        |        |        |        |         |        |        |        |
| 08119/90 |        |        |        |        |         |        |        |        |
| 08/20/90 |        |        |        |        |         |        |        |        |
| 08/21/90 |        |        |        |        |         |        |        |        |
| 08/22/90 |        |        |        |        |         |        |        |        |
| 08/23/90 |        |        |        |        |         |        |        |        |
| 08124/90 |        |        |        |        |         |        |        |        |
| 08125/90 |        |        |        |        |         |        |        |        |
| 08126/90 |        |        |        |        |         |        |        |        |
| 08127/90 |        |        |        |        |         |        |        |        |
| 08128/90 |        |        |        |        |         |        |        |        |
| 08129/90 |        |        |        |        |         |        |        |        |
| 08130/90 |        |        |        |        |         |        |        |        |
| 08131/90 |        |        |        |        |         |        |        |        |
| TOTALS:  | 0      | 0      | 0      | 0      | 0       | 0      | 0      | 0      |

Appendix E-6. Monthly summary of branded accelerated growth chinook sub-yearlings captured at the Rock Island bypass trap, 1 April -31 August, 1990.

| MONTH         | LA/Y/1     | LA/Y/2     | LA/Y/3     | LA/Y/4    | RA/Y/1   | RA/Y/2   | RA/Y/3   | RA/Y/4   |
|---------------|------------|------------|------------|-----------|----------|----------|----------|----------|
| April         | 0          | 0          | 0          | 0         | 0        | 0        | 0        | 0        |
| <b>May</b>    | 284        | <b>252</b> | 293        | 259       | 30       | 24       | 30       | 27       |
| <b>June</b>   | <b>132</b> | <b>87</b>  | <b>106</b> | <b>87</b> | <b>2</b> | <b>5</b> | <b>3</b> | <b>2</b> |
| July          | 1          | 0          | 0          | 0         | 0        | 0        | 0        | 0        |
| <b>August</b> | 0          | 0          | 0          | 0         | 0        | 0        | 0        | 0        |
| TOTALS:       | 387        | 339        | 399        | 346       | 32       | 29       | 33       | 29       |